Agriculture of Vermont

Second Annual Report

of the

Commissioner of Agriculture

of the

State of Vermont

1910

THE CAPITAL CITY PRESS,
Montpelier, Vt.
1910.

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Railroad Officials, Newspaper Men and Speakers on Better Farming Special.

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DEPARTMENT OF AGRICULTURE.

To His Excellency, the Governor of Vermont.

In compliance with Act No. 11, of the Acts of 1908, I herewith submit my second annual report as Commissioner of Agriculture of the State of Vermont.

ORLANDO L. MARTIN,
Commissioner.

Plainfield, October 1, 1910.

ANNUAL REPORT OF THE

Commissioner of Agriculture.

The work of my department has been conducted in accordance with the laws of the State, and the regulations adopted by the Board of Agriculture and Forestry concerning matters under its supervision.

During the past year institutes and farmers' meetings have been held in forty different towns and villages, and have been attended by more than five thousand people. To Vermont talent were added such speakers as N. P. Hull, Master of Michigan State Grange; B. W. McKeen, Lecturer of Maine State Grange; Messrs. Thomas and Roudebush of the Ohio Institute Board; Prof. J. W. Sanborn of New Hampshire, and several others of no less reputation.

The interest and attendance at these meetings was much greater than last year, and their teachings were highly commended in all parts of the State.

The institute season closed with the second annual Farmers' Week, held under the direction of the State Agricultural College and Commissioner of Agriculture. The registration at this meeting was approximately three hundred, and I still believe, as was stated in my last report, that with wider appreciation of its worth this affair will prove invaluable to the agriculturists of Vermont.

PUBLICATIONS.

Since my last report, there have been issued from this office four bulletins. Bulletin No. 3, Clover-seed number, treats of the history of clover-seed traffic in the State. This has been called for considerably for school use and other work. Bulletin No. 4, Farmers' Week number, gives briefs of the addresses at that meeting. That such valuable addresses may have a wider distribution, the same are published in full in this report. Bulletin No. 5, Cow Testing Association number, gives a review of the work of the three associations that have been in operation more than a year, and commends itself to all who are interested in Cow Test Association work. Bulletin No. 6, Bee number, is issued with a view to stimulating an agricultural industry which, though profitable, receives far too little attention in the State today. It is a significant fact that in Addison County alone,

this year, there have been produced one hundred twenty-five thousand pounds of honey. This shows how valuable an industry apiculture might become.

Requests are still numerous for literature relating to Vermont agriculture and agricultural lands. A noteworthy feature about these inquiries is that oftentimes they come from the most distant States in the Union, showing that people are beginning to realize that there is no place east of the Mississippi River where so much can be had for a dollar as right here in Vermont.

FARM CROPS.

The products of the farm this year bid fair to be above the average. The hay crop is a bountiful harvest, being from fifteen to twenty percent above that of last year. Corn and potatoes are promising at the time of this report, and oats are above an average crop. Apples were damaged somewhat by late frosts. Careful investigation shows a variation of from thirty percent to eighty-five percent of a full crop, the largest yield being in Addison County.

I still maintain that the apple industry is neglected. At the New England Fruit Show held in Boston last autumn, comparatively few Vermont apples were shown, but those that were on exhibition received high award in the various classes, which goes to show that Vermont can compete with other New England States in this as well as other industries. I believe that the State can compete successfully with other great apple districts, if the industry is given the same attention here.

THAT RUTLAND SPECIAL.

The train was placed at the disposal of the State Agricultural College and State Commissioner of Agriculture who manned the train with the best talent obtainable, both from the college and elsewhere.

The train was made up of a baggage car, three exhibition coaches and a diner. In the baggage car were housed two dairy cows—one that had made a profit of fifteen dollars per year, and the other a profit of forty-five dollars per year. In this car also was a model silo, all being in charge of Mr. Hall, a young dairy graduate. The second car was in charge of Prof. Washburn, Mr. Martin, and Mr. McKeen of Maine. The exhibits in this car were feeds and dairy utensils, Babcock tester, etc. The feeds showed profitable and unprofitable rations for dairy cows. The third car was given over to horticulture and forestry and was in charge of Forester Hawes, Prof. Cummings, Mr. Kinney and Mr. Wellington. The fourth car contained exhibits of chemicals and commercial fertilizers and was in charge of Dean Hills, Prof. C. H. Jones and Mr. E. S. Brigham.

The train left Burlington at 6:30 A. M., April 12th, and proceeded to Alburgh where the lecturing and demonstrations began. There were three ten-minute talks given in each car, then an opportunity was given to view the exhibits and demonstrations for a half hour.

The train made twenty-four exhibits at as many stations in the four days. Four evening meetings were held. The approximate aggregate attendance of these meetings was fifty-six hundred people.

The train was run over the entire Rutland System in the State and the Bristol railroad, and as the train made its campaign through an excellent farming section of the State, it is believed that the results will be far reaching. It is hoped that its results will appeal to the managements of our other railroad systems sufficiently to induce them to embark in a similar enterprise.

Too much credit cannot be given the officials of the Rutland System for their assistance in making the affair a success and in looking to the convenience of the speakers.

INSECT PESTS.

Protective literature has been sent to the border towns calling attention to the necessity of extreme vigilance in guarding against the infestation of Vermont by the Gypsy and Brown-tail moths. It is known that such infestation exists in every New England State except Vermont, and it is the public and private duty of every citizen to watch for such specimens and report the same to the Vermont Experiment Station or to this office.

The San Jose Scale that gave us some concern in Westminster has been exterminated and the young trees that were too valuable to be cut, are being properly cared for by spraying. In the early spring Brattleboro was found to be badly infested with the scale. Many of the owners showed a willingness to co-operate with this department in cleaning up the pest, and arrangements were made with the selectmen looking toward the total eradication of it.

AGRICULTURAL FAIRS.

The Agricultural Societies are doing a grand work in the promotion of agriculture. From a canvass of the different societies, all but two of which replied, it was found that the total amount of money paid in premiums, exclusive of purses, in 1909 was $38,298.83, a sum which in itself should stimulate farmers to reach the highest possible attainment in the production of animals and crops. The fair is the most opportune time and place to view the best product of the farm and all lines of industry and trade.

The State departments are co-operating with the societies in making these exhibitions of the highest educational value.

TEST ASSOCIATIONS.

Since my last report there have been organized five Cow Testing Associations, making nine now in the State. There are now approximately fifty-three such associations in the United States, and I have reason to believe that Vermont is second only to Wisconsin in number. These associations are doing splendid work in the encouragement of economic dairying. The principal hindrance to forming these is lack of available men to do the work. This is an excellent opportunity for young men to secure profitable employment after taking a short course, at least, in an Agricultural College.

EDUCATION AND LEGISLATION.

While economy is said to be the source of all wealth, I believe that many of your officials are called upon to conduct the affairs of their department with too small an appropriation. Especially is this true of the department of agriculture. Vermont is an agricultural State primarily, and her possibilities along this line are unlimited, and yet, to promote Vermont's first industry, your commissioner is allowed an appropriation equal to only fourteen cents per farm, calculated on the basis of all the farms in the State.

Institutes should be continued in the rural towns. Movable schools of agriculture should be encouraged. Better Farming Special Trains should be run over every railroad system in the State. An agricultural atmosphere should be injected into every public school. Farmer's Week should be continued. The sheep industry should be encouraged by enacting a dog law similar to the law of the State of Connecticut. Provision for creamery and dairy inspection should be made.

All eyes are at present upon the New England States. Let us make Vermont stand out pre-eminently over them all.

LAWS OF VERMONT RELATING TO AGRICULTURE AND FORESTRY.

LAWS OF 1908.

No. 11.—AN ACT ABOLISHING THE BOARD OF AGRICULTURE AND CREATING A BOARD OF AGRICULTURE AND FORESTRY.

SECTION 1. The state board of agriculture and forestry is hereby created consisting of the governor, the director of the Vermont agricultural experiment station, and two citizens of the state, known to be interested in the advancement of agriculture and forestry, who shall be appointed by the governor. The term of office of such appointees shall, except as herein otherwise provided, be four years, beginning on the first day of December, 1908. The first appointments under this act shall be made on or before January 1, 1909, and shall be, one for the term of four years and one for the term of two years. Appointments to fill vacancies shall be for the unexpired term, and succeeding appointments for full terms shall be for four years. Each appointee shall continue in office until his successor is appointed. The members of the board shall receive no compensation for services, but shall be paid their actual necessary expenses incurred in the performance of the services required of them by law.

SEC. 2. The board shall appoint, to hold office during its pleasure, a state forester, who shall be a professionally trained forester. His compensation shall be fixed by the board and shall not exceed twenty-five hundred dollars annually, and actual necessary expenses incurred in the performance of his official duties. He shall, under the general supervision of the board, have direction of all forest interests and all matters pertaining to forestry in the state. He shall be, ex officio, state fire warden. He shall, by complaint to the proper prosecuting officer, cause the prosecution of all persons violating any provisions of the penal laws of the state relating to forests and forest fires and shall cause suits to be instituted by the attorney general in behalf of the state against all persons trespassing upon or injuring any state forest property. He shall manage the state forest reserves. He shall collect data and make expert studies relative to state forest conditions, and conduct experimental investigations pertinent to forestry, which, subject to the approval of the board, may be made in co-operation with the Vermont agricultural experiment station and with the United States forest service; provided, however, that said experiment station bear its proportional share of the total

expense involved in such studies and investigations. He shall be, ex officio, forester in charge of the nursery for forest seedlings. He shall make a full report of his work and the matters in his charge biennially to the general assembly. He may, so far as his other duties permit, prepare bulletins, deliver addresses, lectures and demonstrations in forestry and personally advise owners of forest lands in this state relative to the management of the same, provided, however, that all necessary expenses incident thereto are met by those requesting such services.

SEC. 3. The governor is hereby authorized, upon recommendation of the board, to accept gifts of land to the state, the same to be held, protected and administered as a state forest reserve. The board may in its discretion purchase lands in the name of the state to be held as state forest reserves. All proceeds from the sales of timber or other products from said lands shall be paid to the state treasurer, and be used at the discretion of the board in the furtherance of the forestry interests of the state. All lands held as state forest reserves shall be appraised and set to the state in the grand list of the town where located, and the state shall pay taxes thereon. At each quadrennial appraisal of real estate, the state forester shall be notified by the listers of the appraisal of all lands in the state forest reserve. The state forester may appeal from such appraisal to the county court, which shall, in open court or by commission, hear the state forester and local representatives of the town and by its order fix the appraisal of such lands, which appraisal shall be certified by the clerk of the county court to the town clerk and shall stand as the appraisal for the quadrennial period. Such appeal shall be taken to the term of the county court of the county where the lands are situate next following the filing of the appraisal of the listers, and notice thereof shall be given to one of the selectmen of the town by the state forester at least twelve days before the sitting of the court.

SEC. 4. The state forester may, at the discretion of the board, use such proportion of the sum hereinafter appropriated as seems reasonable for the further development of the nursery for forest seedlings, and for the purpose of supplying such seedlings for the planting of state forest reserves and of private lands, as provided in section 365 of the Public Statutes.

SEC. 5. All the authority and duties now devolving upon the forestry commissioner shall hereafter devolve upon and be exercised by the state forester, and the words "state forester" are hereby substituted for the words "forestry commissioner" or "commissioner" wherever they appear in chapter 24 of the Public Statutes. The state forester may, in his discretion, exercise all the authority of the fire warden in any town or gore in the state, and may do each and every act which the fire warden for such town or gore might do under the provisions of chapter 24 of the Public Statutes and every person and town shall be governed and bound by his acts as if the same were performed by

the fire warden. But the foregoing provision shall not affect the authority of the local fire warden.

(Here follow those sections of the Public Statutes relating to forestry, which were not repealed by the Laws of 1908, showing the law as it now stands. Sections 354 and 355 of the Public Statutes are in effect repealed. Sec. 356 was amended by No. 14, Laws of 1908.)

SECTION 356. The first selectman in each town shall be the forest fire warden therein, and he shall be paid for such services at the same rate as for other official services. Said warden shall, when a forest fire or a fire threatening a forest is discovered in his town, enter upon any premises and take measures for its prompt control and extinguishment; and he may call upon any person in the town for assistance; and said person shall be paid by the town at the rate of fifteen cents per hour; and a person who fails or refuses to assist when so called, and not excused, shall be fined not more than ten dollars. No town shall be held liable in any year for an amount greater than five per cent of its grand list, for the purpose of extinguishing forest fires. The auditor of accounts shall draw an order for any such excess, when the same is duly approved by state forester.

SEC. 357. The state forester may appoint a fire warden for an unorganized town or gore, who shall hold office for one year. He shall have the same powers and duties as town fire wardens and may call on persons not residents of such town or gore for assistance. Expenses incurred by said warden in extinguishing forest fires shall, on approval of said state forester, be paid by an order drawn by the auditor of accounts; but such expense shall not exceed one hundred dollars in a year.

SEC. 358. **Fires in woods.** A person who builds a fire in or adjoining any woods shall totally extinguish such fire before leaving it. A person who violates a provision of this section shall be imprisoned not more than thirty days or fined not more than fifty dollars, or both.

SEC. 359. **Printed warnings.** The state forester shall have notices printed upon cloth, in large letters, containing the provisions of the preceding section and proper warning as to danger of forest fires. Such notices shall be furnished to fire wardens, who shall post them in suitable places, and may also be furnished to private land owners.

SEC. 360. **Fire wardens' records.** The fire wardens shall keep a record of their acts, the amount of expense incurred, the number of fires and their causes, the areas burned over and the character and amount of damage done in their jurisdiction. They shall annually, during the month of January, report these facts to the state forester, on blanks to be furnished by him.

SEC. 361. **Bulletins.** Said state forester may prepare bul-

letins or circulars treating of forest fires, their prevention, the best methods of controlling and extinguishing the same, the laws of the state on the subject, the care of woodlands, the best methods of lumbering, the promotion and preservation of forest growth, and kindred subjects; and such bulletins and circulars may be printed and circulated at the expense of the state and may be included in the printed report of the commissioner of agriculture.

SEC. 362. **Brush fires.** Fires kindled for the purpose of burning brush or for other lawful purpose shall only be kindled at such times and under such conditions as will enable the parties starting them to keep them entirely under control.

SEC. 363. **Penalties and complaints.** An officer who neglects to perform the duties imposed upon him in this chapter, a person who wilfully tears down or defaces a notice posted under the provisions of this chapter, or a person who disobeys any of its provisions for which a penalty is not otherwise provided, shall be fined not more than ten dollars for each offense. The fire warden shall make complaint to the proper officer of offenses under this chapter.

Nursery for Forest Seedlings.

SEC. 364. **Appropriation.** The sum of five hundred dollars is annually appropriated for a period of five years, payable in semi-annual installments on the first day of April and October, for the purpose of aiding in the establishment and maintenance of a nursery for the propagation of forest seedlings of useful varieties at the Vermont agricultural experiment station. The auditor of accounts shall draw an order in favor of such experiment station at the times and for the amounts above specified.

SEC. 365. **Nursery.** Such station shall, at its own expense, furnish the land necessary for such nursery and the necessary expert supervision thereof, and shall, as soon as may be and as far as practicable, furnish to all applicants who are residents of or land owners in this state, material for forest planting at the actual cost of the same; and such material shall be used for forest planting in this state. (See Laws, 1908, No. 11, Sec. 4.)

SEC. 366. **Furnishing seedlings.** The state forester shall furnish to an applicant for such forest seedlings suitable directions for planting the same and shall, when requested, so far as he may be able, furnish skilled assistance or supervision for such work; and the applicant therefor shall pay the expense thereof.

SEC. 367. **Surplus stock.** Any surplus stock in the possession of such station from time to time after the demands mentioned in the second preceding section have been supplied, may be sold at fair market prices to parties for use without the state.

Planting and Perpetuating Forests.

SEC. 368. **Rules.** The state forester shall make rules and

regulations relating to the planting of uncultivated land with timber or forest trees, to the minimum number to be planted to the acre, to the kinds of trees to be planted, to the time of year for planting, and how proof thereof shall be made to the state forester, and to the care of such trees during the term of exemption. He shall furnish a printed copy of such rules to any person upon request.

SEC. 369. **Certificates of Planting.** The state forester shall, upon receipt of due proof of such planting of uncultivated land, furnish the town clerk of the town where the land lies, a certificate of the planting, describing the land so planted.

SEC. 370. **Revocation.** Said state forester shall revoke the certificate of exemption of an owner or occupant of exempt land who violates or knowingly permits to be violated the rules or regulations of said state forester, by giving notice in writing of such revocation to the town clerk with whom the original certificate was filed; and, upon the filing of such notice, such exemption shall cease.

[Here follow those sections of No. 11, Laws of 1908, relating to the Commissioner of Agriculture, to which are added the sections (334-553), P. S., relating to Horticulture, Dairymen's Association, Maple Sugar Makers' Association, State Fair Commission and the Experiment Station, with amendments, if any in 1908, incorporated.]

SEC. 6. The governor shall, by and with the consent of the senate, appoint to hold office during the pleasure of the governor, a commissioner of agriculture, at an annual salary to be fixed by the governor, not to exceed one thousand dollars, and his actual necessary expenses.

SEC. 7. Said commissioner shall promote agricultural interests and education throughout the state by means of institutes, farmers' meetings, lectures, essays, bulletins, crop reports, nature leaflets and such other means as he may deem advisable, and may employ special assistants, lecturers, essayists and experts in conducting meetings, in the preparation of bulletins and crop reports, and in the proper discharge of his duties. The educational work herein provided shall include, among other topics, forestry, tree planting, roads and road making. Lectures and essays shall be given and institutes and meetings held at such places and times as to the commissioner shall seem advisable. The commissioner may, in his discretion and at the expense of the state, attend conventions, meetings or institutes relating to agriculture, held in other states or counties, the annual expenditure therefor not to exceed one hundred dollars.

SEC. 8. Said commissioner may use such means as in his judgment are necessary to exterminate or prevent the introduction of the San Jose scale, the gypsy moth, the brown tail

moth and any other threatening and unusual insect pest found to be injuring vegetable growth. The auditor of accounts shall, upon the requisition of said commissioner, approved by the governor, draw all orders necessary to carry out the provisions of this section.

SEC. 9. Said commissioner shall annually, on or before the first day of October, prepare a detailed report of his work, together with such suggestions in regard to the duties of his office and the advancement of the agricultural interests of the state as may seem pertinent. He may include and publish in such annual reports such addresses, lectures and essays delivered under the provisions of this act as he may deem advisable, and may reprint therein bulletins, crop reports and leaflets. He may in his discretion include in such annual report an abstract of the proceedings of such agricultural clubs or other organizations or institutions for the furtherance of agricultural education and interests as to him shall seem advisable. There shall be published with such annual report, the report of the state forester, of the annual meetings of the State Horticultural Society, of the Vermont Dairymen's Association, of the Maple Sugar Makers' Association and of the State Fair Commission.

SEC. 10. Said commissioner may collect authentic statistical information, as full as practicable, relating to agriculture and agricultural products, farms and farm property, unoccupied farms and waste lands, and such information, under a separate head, may form a part of his annual report. He may also, with the approval of the governor, publish information in separate form, showing by description and illustration the resources and attractions of Vermont and the advantages the state offers to capitalists, tourists, summer visitors and farmers, and shall distribute and advertise the same in such manner as in his judgment will be most effective in developing the resources and advertising the advantages of the state.

SEC. 11. The sum of twelve thousand dollars is hereby annually appropriated for all the purposes of this act. The state board of agriculture shall apportion the appropriation under this act between agriculture and forestry, as in their judgment shall be for the best interest of the state.

SEC. 12. Sections 283, 330, 331, 332, 333, and 6165 of the Public Statutes, and all acts and parts of acts inconsistent with this act are hereby repealed.

SEC. 13. This act shall take effect from its passage.

Approved December 18, 1908.

HORTICULTURAL INTERESTS.

SEC. 334. **Appropriation.** The sum of five hundred dollars is annually appropriated to the Vermont State Horticultural Society for the purpose of promoting, encouraging and devel-

oping the horticultural interests of the state. The auditor of accounts shall draw an order therefor in favor of the treasurer of the society, on the second day of January, annually, so long as the conditions hereinafter provided are complied with.

SEC. 335. **Meetings; premiums.** Such society shall hold annual meetings of at least two days' duration in a suitable building in a town easy of access; and men of horticultural note shall be engaged to teach and discuss the best method of cultivating and marketing fruits, vegetables and flowers. Premiums which shall not exceed one hundred dollars, to be awarded by disinterested and expert judges and paid by the treasurer of the society, shall be offered for the best exhibits of fruits, vegetables and flowers.

SEC. 336. **Accounts.** Said treasurer shall annually, on or before the first day of January, make a detailed and itemized account to the auditor of accounts of the receipts and expenses of such society; and such accounts shall be approved and countersigned by the treasurer and auditor of such society.

VERMONT DAIRYMEN'S ASSOCIATION.

SEC. 337. **Appropriation.** One thousand dollars is annually appropriated to the Vermont Dairymen's Association for the purpose of promoting, developing and encouraging the dairy interests of the state. The auditor of accounts shall draw an order in favor of the treasurer of such association on the first day of January, annually, so long as the conditions hereinafter provided shall be complied with.

SEC. 338. **Meetings; premiums.** The association shall hold annual public meetings of at least three days' duration in a convenient building in a town easy of access. Expert dairymen shall be employed to teach and discuss methods of dairy farming and subjects connected therewith. Premiums to an amount of not less than two hundred dollars to be awarded by disinterested and expert judges and paid by the treasurer of the association, shall be offered for the best exhibits of butter and cheese.

SEC. 339. **Accounts.** The secretary of such association shall annually, on or before the first day of December, make a detailed account to the auditor of accounts of the receipts and expenses of such association; and such account shall be approved and countersigned by the treasurer and auditor of such association.

MAPLE SUGAR MAKERS' ASSOCIATION.

SEC. 340. **Appropriation.** The sum of five hundred dollars is annually appropriated to the Maple Sugar Makers' Association for the purpose of promoting, developing and advertising the maple sugar interests of the state. The auditor of accounts shall draw an order in favor of such association on the first day

of January, annually, so long as the conditions hereinafter provided shall be complied with.

SEC. 341. **Meetings.** Such association shall hold annual public meetings of at least three sessions' duration. At such meetings, papers shall be presented and discussions held upon the improved methods of making and marketing maple sugar products. Premiums shall be offered for the best maple sugar products, to be awarded by disinterested judges and paid by the treasurer of the association, to the amount of at least one hundred and fifty dollars.

SEC. 342. **Secretary's report.** The secretary of such association shall annually, in the month of May or June, cause to be printed and distributed among the sugar makers of the state, a report of the annual meeting, which shall contain a list of the awards made at such meeting. Such association may cause to be printed and circulated at least three thousand copies, each year, of a pamphlet giving detailed information in regard to the manufacture and uses of maple sugar and also containing a list of its members with their post office addresses. Such pamphlet shall be distributed among the dealers in and consumers of maple sugar, as the officers of the association shall approve.

SEC. 343. **Accounts.** Said secretary shall annually, on or before the first day of December, make a detailed statement to the auditor of accounts, of receipts and expenditures of the association; and such account shall be approved and countersigned by the treasurer and auditor of the association.

EXPENDITURE OF APPROPRIATIONS.

SEC. 344. **Injudicious expenditures, etc.** If, in any year, it appears to the auditor of accounts that any part of an annual appropriation provided for in this chapter remains unexpended, or has been injudiciously expended, he shall deduct such amount from such succeeding annual appropriation.

STATE FAIR COMMISSION.

SEC. 345. **Members; term.** A commission consisting of sixteen members, of which the governor be ex-officio a member, shall constitute a state fair commission. The remaining fifteen members of said commission shall be appointed by the governor, one from each county and one from the state at large. Of the fifteen members first appointed, five shall hold office for a term of one year, five for a term of two years and five for a term of three years; and their successors shall each be appointed for a term of three years. The members of said commission shall receive no compensation for their services and expenses.

SEC. 346. **Fair, when held.** Said commission shall annually hold a state fair at such time and place as it deems proper and shall annually, between January first and February fifteenth,

publish a notice of the time and place of holding such fair in such year; provided that before said commission holds a state fair, it shall receive a guarantee satisfactory to it that all expenses of such fair in excess of the receipts therefrom, including the appropriations hereinafter referred to, will be paid by the parties executing such guarantee. Such commission may make, alter, suspend or repeal rules and regulations relating to such fair.

SEC. 347. **Superintendent; assistants.** Said commission may appoint and remove at pleasure a superintendent of such fair and such other assistants and employés as it deems necessary and may prescribe their duties and fix their compensation.

SEC. 348. **Commission's duties.** Said commission shall receive all moneys payable to the state on account of such fair and make all disbursements therefrom and also from any appropriation made for that purpose by the general assembly as may be needed, from time to time, in carrying on the work of said commission. At the close of each fair, said commission shall pay to the state treasurer any balance remaining in its hands, received in connection with such fair, and, at the same time, deliver to the auditor of accounts an itemized report showing all receipts and disbursements for state fair purposes since its last report.

No. 12.—AN ACT TO APPROPRIATE MONEY FOR THE USE OF THE STATE FAIR COMMISSION. (1908.)

SECTION 1. The sum of five thousand dollars is hereby appropriated for the purposes of the state fair, to be used by the state fair commission in the year 1909. And five thousand dollars is hereby appropriated for said fair to be used by said commission in the year 1910. Provided, however, that no part of such sum shall be paid to said commission for the purposes of such fair, until the auditor of accounts shall be satisfied that all expenses of such fair, over and above the receipts thereof and the amount of the appropriation, are secured by a sufficient guarantee thereof. Nor until said auditor of accounts shall have satisfied himself that the title of the state fair grounds, so-called, in the town of Hartford, is vested in the state of Vermont, clear of all incumbrance, and that the sum of five thousand dollars shall have been paid over to the state fair commission from individual subscriptions, for its uses during the year 1909.

SEC. 2. Such sums of money as are appropriated by section 1 of this act for the purposes of the state fair shall be used by the state fair commission at the annual state fairs of 1909 and 1910, in offering premiums for competition upon agriculture products, and upon animals such as cattle, horses, sheep and swine, and upon poultry of all kinds. No part of the above mentioned appropriation shall be used for any purpose other than that mentioned in this section.

VERMONT AGRICULTURAL EXPERIMENT STATION.

SEC. 349. **Establishment.** For the promotion of scientific and practical agriculture and for the prevention of frauds and adulterations in commercial fertilizers, foods, feeding stuffs, seeds and commercial products, the Vermont agricultural experiment station is hereby established in connection with and under the control of the University of Vermont and State Agricultural College.

SEC. 350. **Board of control; officers.** The trustees of the University of Vermont and State Agricultural College shall annually appoint two of their number, who, with the president of such institution as their chairman, shall act as a board of control for such experiment station. Said board shall appoint a director and such other officers and employés, as it deems proper for such experiment station, and audit all bills and have general oversight and direction of its affairs.

SEC. 351. **Officers' duties.** The director and other officers of such experiment station shall investigate such subjects as the board of control may, from time to time, direct; but they are especially charged:

I. With investigations relating to the ravages of insects and the dissemination of such information as may be advisable for their abatement.

II. With investigations and experiments directed to the introduction and fostering of new agricultural industries adapted to the various climates and soils of the state, and especially of new fodder plants and feeding stuffs.

III. With conducting experiments on the nutrition and growth of plants, with a view to ascertain what fertilizers are best suited to the various crops of this state.

SEC. 352. **Analyses.** The officers and employés of the experiment station shall, so far as time and means permit, make analyses of all samples received of unlicensed commercial fertilizers, home made fertilizers, and material for composting the same. They shall also analyze soils, feeding stuffs, milk, butter, oleomargarine and other substitutes for butter, drinking water and other substances or products; provided that, in their judgment, such analyses will be for the public good. All such analyses shall be free of charge to residents of this state.

SEC. 353. **Bulletins; report.** The director of the experiment station shall, from time to time, publish bulletins of its work. Copies thereof shall be furnished free to any one sending his address, and at least two copies shall be sent to each post office. Said director shall, at an expense not to exceed one thousand dollars, publish an annual report for free distribution. The auditor of accounts shall audit the accounts for printing such report and draw his order therefor.

LAWS OF VERMONT RELATING TO REGULATION OF TRADE.

PUBLIC STATUTES.

MILK, CREAM, BUTTER AND CHEESE.

No. 118.—AN ACT TO PROVIDE FOR THE INSPECTION OF MILK. (1908.)

SECTION 1. No person carrying on the business of selling, supplying or delivering milk or cream from house to house, shall sell, supply or deliver, milk or cream, whether produced from cows owned by him, or in his possession, or under his control, or purchased by him for sale from other dairies, to the inhabitants of the state unless he has procured a license therefor from the board of health of the town in which such milk is sold, which is hereby authorized to issue licenses under this act. Before granting such license, the state board of health, or their authorized agents, or said local board of health, shall make, or cause to be made, a thorough inspection and examination of the cows producing such milk or cream, of the barns, stables and premises where such cows are kept, of all pails, cans and measures used in connection with such business, and of the neatness and cleanliness with which such milk or cream is obtained and dispensed. Such licenses shall not be granted unless such cows are in a healthy condition, nor unless the barns, stables, premises and utensils used in connection therewith are in good sanitary condition nor unless such milk and cream is obtained and sold in a neat and cleanly manner; and if the state board of health certify to the board of health of any town that a person named therein should not be granted a license, a license shall not be granted such person.

No person who shall incidentally sell or furnish to his neighbors milk or cream from his private dairy shall be construed to be carrying on the business of selling or supplying milk or cream within the meaning of this act.

SEC. 2. Such license shall be for a term of one year, unless sooner revoked by said board for just cause, and the fee for such license shall be two dollars, to be retained by said board for its services under this act.

SEC. 3. The local board of health shall, at least semi-annually, send to the state laboratory of hygiene for examination, samples of milk or cream from the herd of each party who has obtained a license, and said licensee shall allow said board to take such samples whenever they desire. A person who violates a provision of this act shall be fined not more than fifty nor less than five dollars.

SEC. 4. This act shall take effect April 1, 1909.

GENERAL PROVISIONS.

SEC. 4927. **Dilution or adulteration of milk; penalty.** No person shall sell, furnish or have in his possession, with intent to sell or furnish, milk or cream diluted with water, adulterated or not of standard quality, or milk or cream which is treated with chemicals; nor shall a person sell, offer for sale or furnish milk from which the cream or a part thereof has been taken, or retain the part of the milk known as "strippings," without the full knowledge of the person to whom such milk is sold, offered for sale or furnished. A person who violates a provision of this section shall be fined not more than three hundred dollars nor less than fifty dollars for each offense.

SEC. 4928. **Standard of milk as paying basis.** Milk containing four per cent of butter fat shall be the standard used as a paying basis in creameries and cheese factories.

SEC. 4929. **Test of samples; evidence.** Whenever, in prosecutions under the second preceding section, the ordinary means of proof are not available or sufficient, sealed samples of the milk or cream sold or furnished, or kept with intent to be sold or furnished, taken from such milk or cream in the presence of at least one disinterested witness and with the knowledge and in the presence of the person or his agent or servant so selling or furnishing, or having in his possession with intent to sell or furnish such milk or cream, may be sent to the Vermont agricultural experiment station to be tested; and the result of such test shall be deemed competent evidence in such prosecutions, but shall not exclude other evidence.

SEC. 4930. **Same; disposition.** Such samples shall be placed in tin or glass vessels securely sealed with a label thereon stating the time when and place where the sample was drawn, from whose milk or cream taken, and signed by the person taking the same and by one or more disinterested witnesses. Upon request, a like sample shall be given to such person, his agent or servant, for which a receipt shall be given to the person taking or drawing the same.

SEC. 4931. **Standard milk defined.** Standard milk shall contain not less than twelve and one-half per cent of solids, or not less than nine and one-fourth of total solids exclusive of fat, except in the months of May and June when it shall contain not less than twelve per cent of total solids. This rule shall govern tests made at such experiment station, and an officer or employé thereof found guilty of fraud in making tests shall be fined one thousand dollars.

SEC. 4932. **Fraudulent marking of butter or cheese; penalty.** A person who marks or otherwise designates or causes to be marked or otherwise designated as "creamery" butter or cheese, or the packages in which it is contained, when such butter or cheese is not manufactured at a creamery, or sells or offers to

sell any such butter or cheese so marked, shall be fined not more than three hundred dollars nor less than fifty dollars; provided that a person may brand, mark or otherwise designate the product of his dairy as "private creamery," and, in such case, the name of the maker shall be plainly marked on each package so branded or designated.

SEC. 4933. **Jurisdiction of justice.** Justices shall have concurrent jurisdiction with the county court of prosecutions under the six preceding sections.

SEC. 4934. **Sale of diluted milk or cream; penalty.** A person who knowingly sells or furnishes or offers to sell milk or cream diluted with water or adulterated shall forfeit to the person to whom such milk or cream is sold or furnished not more than one hundred dollars nor less than twenty-five dollars, to be recovered in an action on this statute before a justice.

SEC. 4935. **Penalty for supplying to and use by a manufacturer of diluted or adulterated milk or cream.** A person who knowingly sells, supplies or brings to be manufactured to a butter or cheese manufactory in the state milk or cream diluted with water, or adulterated, or milk from which cream has been taken, or keeps back part of the milk known as "strippings," or knowingly brings or supplies milk or cream to a butter or cheese manufactory that is tainted or partly sour from want of care in the keeping of strainers or vessels in which such milk or cream is kept, or a butter or cheese manufacturer who knowingly uses or directs his employés to use cream from the milk brought to such butter or cheese manufacturer, without the consent of the owners thereof, shall forfeit not more than one hundred dollars nor less than twenty-five dollars, to be recovered in an action on this statute, before a justice, in the name and for the benefit of those upon whom such fraud is committed.

MISUSE OF MILK RECEPTACLES.

SEC. 4936. **Misuse; penalty.** A person who, by himself, his servant or agent, or as the servant or agent of any other person, partnership or corporation, having the custody of a receptacle used as a container for milk destined for sale or for use in the manufacture of any food product destined for sale, places, or causes or permits to be placed, or suffers to remain therein, any offal, swill, kerosene, vegetable matter or any article or substance other than milk, skimmed milk, butter milk, cream, or water or other agent used for cleansing such receptacle, shall be fined no more than ten dollars for each receptacle so misused.

SEC. 4937. **Shipping misused receptacles; penalty.** A person who, by himself, his servant or agent, or as the servant or agent of any other person, partnership or corporation, sends, ships, returns or delivers, or causes or permits to be sent, shipped returned or delivered, or in any way aids or assists therein, to a

producer of milk or to any other person, any receptacle used as a container of milk, containing any offal, swill, kerosene, vegetable matter, or any other offensive material or substance shall be fined not more than ten dollars for each offense.

SEC. 4938. **Duty of person receiving misused receptacles.** A person who receives from a person, partnership or corporation any receptacle used or to be used as a container of milk, containing any offal, swill, kerosene, vegetable matter, decayed or decomposed matter, or any other offensive material or substance, shall forthwith submit such receptacle to the health officer of the town where such receptacle is received, for examination; and if such health officer finds such receptacle to be in such condition as to be a menace to the public health, it shall be adjudged a nuisance, and the health officer shall act relative thereto as provided in chapter two hundred and twenty-five.

SEC. 4939. **Same; penalty.** A person who fails to submit to the health officer a receptacle used or to be used as a container of milk, as directed in the preceding section, shall be fined not more than five dollars for each offense.

MILK AND CREAM TESTS.

SEC. 4940. **Bottles, pipettes and measuring glasses.** Bottles, pipettes or measuring glasses used by a person in determining by test the value of milk or cream received from other persons shall, before such use, be tested for accuracy of measurement and for accuracy of the per cent scale marked thereon at the Vermont agricultural experiment station. Such bottles, pipettes or measuring glasses as are correct shall be marked in permanent marks or characters, which shall be proof that they were so tested; but no incorrect bottles, pipettes or glasses shall be marked. The person owning such bottles, pipettes or measuring glasses shall pay the actual expense of testing the accuracy of the same.

SEC. 4941. **Certificate of competency to operator; fee.** A person who manipulates a mechanical or chemical test for the purpose of measuring the percentage of butter fat in milk or cream as a basis for apportioning its value, or the butter or cheese made from the same shall secure a certificate from the University of Vermont and State Agricultural College, certifying that he is competent to perform such work. The dean of the agricultural department of such institution may make rules and regulations governing the application for and the granting of such certificates, and may charge a fee for such certificates not to exceed one dollar, the same to be used in defraying the expenses incurred under the provisions of this section.

SEC. 4942. **Violating provisions of two preceding sections; complaints; penalty.** A person who violates a provision of the two preceding sections shall be fined not more than twenty-

five dollars for the first offense nor more than fifty dollars for each subsequent offense. Sheriffs, deputy sheriffs, and constables shall institute complaint against a person violating a provision of the two preceding sections, and one-half of the fine shall go to the complainant and the other half to the state.

MILK TICKETS.

SEC. 4943. **Form; use; penalty.** Retail dealers in milk who use milk tickets shall have the same printed in coupon sheets of convenient size to furnish customers, which shall be taken up by tearing off coupons from the sheet, and such coupons shall be immediately destroyed. A person using a coupon the second or subsequent time shall be fined five dollars for each offense.

IMITATION OF BUTTER AND CHEESE.

SEC. 4944. **Imitation of butter; labels.** A person who, by himself or agent, sells, exposes for sale or has in his possession with intent to sell, an article, substance or compound, made in imitation of butter or as a substitute for butter, and not made wholly of milk or cream, or containing fats, oils or grease not produced from milk or cream, shall have the words "imitation butter," or if such substitute is a compound known as oleomargarine, then the word "oleomargarine," or if it is known as butterine, then the word "butterine," stamped, labeled or marked upon the top, side and bottom of each tub, firkin, box, or package containing such article, substance or compound; or if such article, substance or compound is not in the original package, then upon a label to be attached in a conspicuous place to such article, substance or compound. In case of retail sales of such article, substance or compound not in the original package, the seller shall attach in a conspicuous place to each package and deliver therewith to the purchaser a label or wrapper bearing the words "imitation butter," "oleomargarine," or "butterine," as the article may be. Such words shall be stamped, labeled or marked in a straight line in printed letters of plain uncondensed gothic type, not less than one-half inch in length so that such words cannot be easily defaced, and no other words shall appear in connection therewith.

SEC. 4945. **Imitation of cheese; labels.** A person who, by himself or agent, sells, exposes for sale or has in his possession with intent to sell, an article, substance or compound made in imitation of or as a substitute for cheese and not made wholly from milk or cream, or containing fats, oils or grease not pro duced from milk or cream, shall have the words "imitation cheese" stamped, labeled or marked in printed letters of plain roman type, not less than one inch in length so that such words cannot be easily defaced, upon the side of each cheese cloth or

band around the same, and upon the top and side of each tub, firkin, box or package containing such article, substance or compound. In case of retail sales of such article, substance or compound not in the original package, the seller shall attach in a conspicuous place to each package and deliver therewith to the purchaser a label or wrapper bearing the words "imitation cheese" in printed letters of plain roman type, not less than one-half inch in length.

SEC. 4946. **Violating provisions of two preceding sections and defacing labels; penalty.** A person who violates a provision of the two preceding sections, or who, with intent to deceive, defaces, erases, cancels or removes a mark, stamp, brand, label or wrapper provided for in the two preceding sections, shall forfeit to the town in which the offense was committed one hundred dollars, and, for each subsequent offense, two hundred dollars.

SEC. 4947. **Sale of imitation butter as butter; penalty.** A person who, by himself or agent, sells, exposes for sale or has in his possession with intent to sell, an article, substance or compound made in imitation of butter or as a substitute for butter and not made wholly of milk or cream, or containing fats, oils or grease not produced from milk or cream, contained in a box, tub, article or package, marked or labeled with the word "dairy," or the word "creamery," or the name of a breed of dairy cattle, shall forfeit to the town in which the offense is committed one hundred dollars, and, for each subsequent offense, two hundred dollars.

SEC. 4948. **Prosecutions.** The state's attorney for the county in which a violation of a provision of the four preceding sections is committed shall prosecute for such violation; and he may enter places where butter or cheese is stored, or kept for sale, and may take specimens of suspected butter and cheese, and cause them to be analyzed or otherwise satisfactorily tested; and he shall record and preserve the result of such analysis or test as evidence. The expense of such analysis or test not to exceed twenty dollars in any one case may be included in the costs of prosecution.

SEC. 4949. **"Butter" and "cheese" defined.** The words "butter" and "cheese," as used in the first, second, fourth and fifth preceding sections, shall mean the products usually known by those names, manufactured wholly from milk or cream with salt and rennet with or without coloring matter.

MONTHLY CREAMERY AND CHEESE FACTORY STATEMENTS.

SEC. 4950. **Contents of creamery statements.** An owner, operator or manager of a co-operative or proprietary creamery shall make and deliver monthly to each patron of such creamery a statement of the number of pounds of milk or cream said patron

delivers during that month, together with the test, pounds of butter fat, gain per cent from the churn; and the price paid for the same shall be computed by the number of pounds of butter fat. Such monthly statement shall also contain the total number of pounds of butter made for that month.

SEC. 4951. **Computation of price of milk.** An owner, operator or manager of a co-operative or proprietary creamery who sells or otherwise disposes of milk or cream received at such creamery shall weigh and carefully sample the same, and shall test such samples for the purpose of ascertaining the number of pounds of butter fat in such milk or cream sold or otherwise disposed of; and the price paid for the same shall be computed by the number of pounds of butter fat.

SEC. 4952. **Contents of cheese factory statements.** The owner, operator or manager of a co-operative or proprietary cheese factory shall make and deliver to each patron of such factory a statement representing the number of pounds of milk he delivers during each month, together with the test and actual number of pounds of cheese produced by such milk for such month. The price paid for the same shall be computed on the actual number of pounds of cheese.

SEC. 4953. **Violating provisions of the three preceding sections; penalty.** A manager or proprietor of a creamery or cheese factory who fails to comply with a provision of the three preceding sections shall be fined not more than twenty-five dollars nor less than ten dollars for each offense.

CHAPTER 211.

FOREIGN CREAMERY ASSOCIATIONS.

SEC. 4954. **"Company" defined.** The word "company," as used in this chapter, shall mean a company, association, corporation, partnership or individual.

SEC. 4955. **Commissioners.** The secretary of state and the state treasurer shall, by virtue of their offices, be the commissioners mentioned in this chapter.

SEC. 4956. **License required; prerequisites.** A foreign company doing a butter, cheese, cream, milk or condensed milk business in the state shall not transact or carry on such business unless such company first obtains a license of said commissioners authorizing the company so to do. Before receiving such license, the company shall file with the secretary of state a certified copy of its charter and by-laws, or articles of association, and a statement under oath of its president and secretary showing the amount of its capital stock, where and in what invested, and the true financial condition and standing of such company; and, in case of a partnership or individual, a statement, under oath,

showing the amount of assets and liabilities, and their nature and extent shall be fully and completely set forth.

SEC. 4957. **Issuance and renewal of licenses; fees.** Upon receiving such copies and statements, if the commissioners are satisfied with the same, and upon the payment of a license fee of five dollars, they shall grant a license authorizing such company to do business in the state until the first day of April thereafter; and annually thereafter, on the first day of April, such license may be renewed upon the payment of a like fee, so long as such company complies with the provisions of law, and the commissioners regard the company safe and entitled to public confidence.

SEC. 4958. **Bonds.** If, after receiving such copies and statements, the commissioners are satisfied that such company is not safe and entitled to public confidence, they shall, before granting such license, require of such company a bond, with good and sufficient sureties, in such sum as the commissioners direct, conditioned for the payment of all sums recovered against it; and such bond shall be renewed annually and from time to time as the commissioners direct. Additional bonds may be required by the commissioners at any time for the protection of the patrons of such company.

SEC. 4959. Such company shall file in the town clerk's office in each town where it does business a duplicate of its license, and shall at the time of filing such duplicate license file therewith a statement under oath of its president and secretary, showing the amount of its capital stock, where and in what invested, and the true financial condition and standing of such company; and, in case of a partnership or individual, a statement under oath showing the amount of assets and liabilities and their nature and extent shall be fully and completely set forth. The commissioners shall receive one dollar for each duplicate license.

SEC. 4960. **Service of process.** At the time of filing such duplicate license in the town clerk's office, the company shall also file with the town clerk, a statement setting forth its principal place of business and designating a person in such town upon whom process may be served. Such designation shall continue in force until revoked by an instrument in writing designating in like manner some other person upon whom process may be served. If the person dies or removes from the town and the company does not, within thirty days after such death or removal, designate in like manner, another person upon whom process may be served, the same may be served on the town clerk of such town, by duplicate copies, one of which shall be immediately forwarded by the town clerk, by mail, prepaid, to such company; and there shall be paid to the town clerk by the officer at the time of service the sum of fifty cents.

SEC. 4961. **Penalty; jurisdiction.** A company that neglects

or refuses to comply with a provision of this chapter shall be fined not more than one hundred dollars nor less than ten dollars with costs of prosecution, for each day's neglect or refusal. Justices and municipal courts shall have concurrent jurisdiction with the county court of offenses arising under this chapter.

CHAPTER 212.

TRADE MARKS; PROTECTION OF DEALERS IN MILK AND BEVERAGES.

SECTION 4962. A person, partnership or corporation, or an association or union of working men, may adopt as and for a trade-mark or trade name any particular name, term, design, device, label, stamp or form of advertisement not previously owned or adopted by another person, partnership or corporation, or association or union of working men, to designate or distinguish goods, wares or merchandise by him or them manufactured or prepared, or on which the labor of persons belonging to such association or union of working men has been put, and may file the same for record in the office of the secretary of state by leaving two copies, counterparts or facsimilies thereof with said secretary, and shall also file therewith an accurate description of such name, term, design, device, label, stamp or form of advertisement, verified under oath by the person or some officer of the partnership, corporation or association or union of working men by whom it is filed.

The fee for such filing shall be two dollars.

The secretary of state may make such rules and regulations and prescribe such forms as may be necessary to carry out the provisions of this chapter.

SEC. 4963. The secretary of state shall deliver to the person, partnership, corporation or association or union of working men so filing such trade mark or trade name, a duly attested certificate of the record thereof, for which he shall receive a fee of two dollars.

Such certificate shall, in all suits and prosecutions under this chapter, be sufficient proof of the adoption of such trade-mark or trade name.

No name, term, design, device, label, stamp or form of advertisement shall be recorded that in any way resembles or would be reasonably mistaken for a name, term, design, device, label, stamp or form of advertisement already on record.

PENALTIES.

SEC. 4964. **Use of trade-mark without authority of owner.** A person who, without authority from the owner of a trade-mark or trade name, adopted and recorded as aforesaid, knowingly and wilfully makes or sells a representation, likeness, similitude,

copy, imitation or counterfeit of such trade-mark or trade name, or who, without authority from such owner, affixes, impresses or uses such trade-mark or trade name upon any goods, wares or merchandise, shall be imprisoned not more than one year or fined not more than one thousand dollars, or both.

SEC. 4965. A person who knowingly and wilfully sells or keeps for sale goods upon which or in connection with which is affixed a forgery, imitation or counterfeit of a trade-mark or trade name adopted and recorded as provided in this chapter, and intended to represent such goods as the genuine goods of another person, or as goods upon which the labor of a member or members of such association or union of working men has been put, shall be punished as provided in the preceding section.

SEC. 4966. A person who, with intent to defraud another person, partnership, corporation, or association or union of working men, knowingly affixes or causes to be affixed to or upon a package or bottle containing goods, wares or merchandise a name, term, design, device, label, stamp or form of advertisement, which designates such goods, wares or merchandise either wholly or in part, by a word or words, or by general design, which is wholly or in part the same, either in appearance or in sound, as the word or words or the general design of a trade-mark or trade name adopted and recorded as provided in this chapter, or who knowingly sells or exposes for sale such package or bottle with such imitating or counterfeit name, term, design, device, label, stamp, or form of advertisement, may also be imprisoned not more than one year or fined not more than five hundred dollars, or both.

SEC. 4967. The court of chancery may, on complaint of the owner of a trade-mark or trade name adopted and recorded as provided in this chapter, enjoin other persons, partnerships, corporations, or associations or unions of working men, from the manufacture, use or sale, without the authority of the owner, of all likenesses, similitudes, copies, imitations or counterfeits thereof, and also from selling or exposing for sale goods, compounds or preparations, to or with which such unauthorized likenesses, similitudes, copies, imitations or counterfeits are affixed or connected, and may award to such complainant such a sum of money as shall be just and reasonable compensation for the damage to the reputation of the complainant's genuine goods, compounds, preparations, trade-mark or trade name, by reason of such wrongful manufacture, use, sale or exposure for sale, and may also require the defendant to pay to the complainant in such cause a sum equal to the amount which the complainant would have received for the same quantity of genuine goods, compounds or preparations, and may also order that all such likenesses, similitudes, copies, imitations or counterfeits in the possession or under the control of the defendent be delivered to an officer of the court or to the complainant, to be destroyed.

Approved December 17, 1908.

MILK CANS AND OTHER RECEPTACLES.

SEC. 4968. **Publication and registration of name, mark, etc., of owner.** A person or corporation engaged in buying, selling or dealing in milk, cream or non-intoxicating beverages in receptacles, or a licensed buyer, dealer in or vender of intoxicating beverages, whose name, mark or other device is produced in a permanent manner in or upon such receptacle, may file in the office of the clerk of the town in which their principal place of business is situated, a description of the name, mark or other device so used by them, and cause such description to be published in such town four weeks successively in a newspaper published therein; and, if no newspaper is published therein, such publication shall be in a newspaper published in the county in which such town is situated.

SEC. 4969. **Use without consent of owner; penalty.** A person, who, without the owner's consent, buys, sells, takes, uses in his business, conceals or disposes of a receptacle belonging to a person or corporation which has complied with the provisions of the preceding section shall be imprisoned not more than sixty days or fined not more than five dollars; for each receptacle so unlawfully bought, sold, taken, used, concealed or disposed of: and, for each subsequent offense, said person shall be imprisoned not more than six months or fined not more than ten dollars, for each receptacle so unlawfully bought, sold, taken, used, concealed, or disposed of. The possession by a person in the transaction of his business of a receptacle, the owner of which has complied with the provisions of the preceding section, shall be prima facie evidence that the same was unlawfully bought, sold, taken, used, concealed or disposed of.

SEC. 4970. **Mutilating receptacle or erasing name, etc.; penalty.** A person who wilfully destroys, mutilates or defaces a receptacle bearing the name or other device of an owner who has complied with the provisions of the second preceding section or wilfully erases, mars, covers or changes a name or other device produced in a permanent manner in o upon such receptacle, shall be imprisoned not more than sixty days or fined not more than five dollars, for each receptacle so destroyed, mutilated or defaced, or upon which a name or other device has been erased, marred, covered or changed; and, for each subsequent offense, he shall be imprisoned not more than six months or fined more than ten dollars, for each receptacle so destroyed, mutilated or defaced or upon which a name or other device has been erased, marred, covered or changed.

SEC. 4971. **Mutilating, etc., butter crates or carriers; penalty.** A person who puts any unclean or foul matter into a receptacle, the owner of which has complied with the provisions of the third preceding section, or who mutilates, destroys or pollutes a butter crate or carrier, shall be fined not more than five dollars

nor less than fifty cents for each receptacle so defiled, mutilated or destroyed, and, for each subsequent offense, shall be fined not more than twenty dollars nor less than two dollars for each receptacle so defiled, mutilated or destroyed.

SEC. 4972. **Search warrant; proceedings.** If a person or corporation which has complied with the provisions of the fourth preceding section, or the agent of such person or corporation, makes oath before a justice or judge of a municipal court that he has reason to believe and does believe that a person has unlawfully in his possession or is secreting a receptacle marked as provided in the fourth preceding section, said justice or judge shall, if satisfied that there is a reasonable cause for the belief, issue a search warrant to discover and obtain the same, and may cause to be brought before him a person in whose possession such receptacle is found, and shall thereupon inquire into the circumstances of such possession; and if said justice or judge finds that such person is guilty of a wilful violation of a provision of the three preceding sections, he shall impose the penalty prescribed therein, and award to the owner the possession of the property taken upon such search warrant.

CHAPTER 213.

SALE OF COMMERCIAL FERTILIZERS AND FEEDING STUFFS.

Definitions.

SEC. 4973. **"Commercial fertilizer."** The words "commercial fertilizer," as used in this chapter, shall mean compounds and manufactured substances containing or represented as containing two or more of the ingredients mentioned in the third following section, but shall not apply to the separate ingredients used to manufacture the same, or to bone meal, land plaster, lime or a substance the product of nature which is not compounded.

SEC. 4974. **"Importer."** The word "importer," as used in this chapter, shall mean a person who sells or procures for sale commercial fertilizers or concentrated commercial feeding stuffs made in other states.

SEC. 4975. **Brands.** For the purposes of this chapter, commercial fertilizers and commercial feeding stuffs shall be considered as distinct brands when differing either in guaranteed composition, trade-mark, name, or in a characteristic method of marking of whatever nature.

COMMERCIAL FERTILIZERS.

SEC. 4976. **Statement of contents.** Every lot or parcel of commercial fertilizer sold, offered or exposed for sale, the retail price of which is ten dollars or more per ton, shall be accompanied by a plainly printed statement, clearly and truly certifying the number of net pounds of fertilizer in a package, the

name, brand or trade-mark under which the fertilizer is sold, the name and address of the manufacturer or importer, and a chemical analysis stating the minimum percentages of nitrogen, of potash soluble in distilled water, and of soluble, reverted, insoluble, available and total phosphoric acids, and the maximum percentage of chlorine; and the several constituents shall be determined by the methods adopted by the association of official agricultural chemists.

SEC. 4977. **Licenses; fees.** A manufacturer, importer, agent or seller of a commercial fertilizer, the retail price of which is ten dollars or more per ton, shall annually, in the month of December and before the same is sold, offered or exposed for sale, pay the director of the Vermont agricultural experiment station a license fee of one hundred dollars. Said director, on the receipt of such fee, shall issue to such person a license permitting the sale of not more than five brands of commercial fertilizer which shall be the product of the licensee. If a manufacturer, importer, agent or seller desires to sell, offer or expose for sale more than this number of brands, he shall annually, in the month of December, pay a license fee of twenty dollars for each kind of commercial fertilizer bearing a distinctive name, brand or trade-mark, which said manufacturer, importer, agent or seller desires to sell, offer or expose for sale in excess of five; provided that if such fertilizer is claimed to contain or does contain phosphoric acid and either nitrogen or potash only, the license fee shall be fifteen dollars. Said director on receipt of such fees, shall issue to such person a license for the sale of the kinds of commercial fertilizer for which the fee is paid.

SEC. 4978. **Same; expiration; term.** If a manufacturer, importer, agent or seller of a commercial fertilizer desires to sell such material and has not paid the license fee therefor as required in the preceding section, he shall pay the license fee prescribed therein before offering or exposing the material for sale. The license fee due in December shall cover and authorize sales of the kinds of commercial fertilizer specified in the license for the calendar year succeeding that month. Licenses shall expire on the thirty-first day of December of the year for which they are issued. If a manufacturer, importer or shipper of a commercial fertilizer or material used for manurial purposes pays the required license fee, no agent or seller of said manufacturer, importer or shipper shall be required to pay such fee.

SEC. 4979. **Samples; analyses.** A resident of this state purchasing for his own use a commercial fertilizer that has been duly licensed for sale in the state may require the dealer to draw in his presence a sufficient quantity of such commercial fertilizer to serve as a sample for chemical analysis, and said dealer shall certify that the sample drawn fairly and correctly represents the average composition of the fertilizer sold. Such sample shall be sent by the buyer in a sealed vessel, charges prepaid, to such experiment station, accompanied by a certified statement from the

buyer, giving the name and address of the manufacturer, the name and address of the agent or person from whom it was purchased, the date of its manufacture, the date and place of drawing the sample, and its guaranteed composition and selling price. Said director shall cause to be analyzed, free of charge, all such samples, and shall send copies of the analysis as soon as made to the person sending the sample and to the dealer from whom it was purchased; provided that there shall not be required in any one year more than two such analysis of the same brand of fertilizer.

SEC. 4980. **Prohibited materials in composition.** No person shall sell, offer or expose for sale leather or its products, hair, wool waste, garbage, tankage or inert nitrogenous material, as a fertilizer, or as an ingredient thereof, unless an explicit printed statement of the fact is conspicuously affixed to each package of such fertilizer, and accompanies each such parcel or lot of the same.

SEC. 4981. **Illegal sales; penalty.** A person who knowingly sells, offers or exposes for sale a commercial fertilizer without the statement required by section four thousand nine hundred and seventy-six, or containing a smaller percentage of one or more of the ingredients named therein, except chlorine, than is specified on the label, or for the sale of which the required license fee is not paid, or a person who fails to comply with a provision of this chapter, subject to the exceptions named in section four thousand nine hundred and eighty-nine, shall be fined not more than fifty dollars for the first offense nor more than one hundred dollars for each subsequent offense.

SEC. 4982. **Disposition of license fees.** The license fees received by said director shall be paid to the state treasurer. The auditor of accounts shall annually, on or before the thirtieth day of June, draw an order in favor of the treasurer of the experiment station in payment of the expenses incurred by said director in compliance with the provisions of this chapter relating to commercial fertilizers; but such order shall not exceed the amount of the license fees paid to the state treasurer as hereinbefore provided. The director shall annually publish a statement of the receipts and expenditures under the preceding sections of this chapter.

CONCENTRATED COMMERCIAL FEEDING STUFFS.

SEC. 4983. **"Concentrated commercial feeding stuff" defined.** The words "concentrated commercial feeding stuff," as used in this chapter, shall include linseed meals, cottonseed meals, cottonseed feeds, pea meals, cocoanut meals, gluten meals, gluten feeds, maize feeds, starch feeds, sugar feeds, dried distiller's grains, dried brewer's grains, malt sprouts, hominy feeds, cerealine feeds, rice meals, oat feeds, corn and oat chops, corn and oat

feeds, corn bran, ground beef or fish scraps, meat and bone meals, mixed feeds other than those composed solely of wheat bran and middlings mixed together or with pure grains, provenders other than those composed of pure grains ground together, condimental stock and poultry foods, patented proprietary or trade-marked stock and poultry foods and other materials of a similar nature not named in the following section.

SEC. 4984. **Same.** The words "concentrated commercial feeding stuff," as used in this chapter, shall not include hay and straw, the whole seed nor the unmixed meals made directly from the entire grains of wheat, rye, barley, oats, Indian corn, buckwheat, India wheat and broom corn; nor shall it include wheat; rye and buckwheat bran or middlings not mixed with other substances but sold separately as distinct articles of commerce, nor wheat bran and middlings mixed together and not mixed with other substances, nor pure grains ground together, when unmixed with substances other than wheat, rye or buckwheat bran or middlings.

SEC. 4985. **Statement of contents.** Every lot or parcel of concentrated commercial feeding stuff as defined in this chapter used for feeding farm live stock, sold, offered or exposed for sale, shall have a plainly printed statement conspicuously affixed thereto clearly and truly certifying the number and net pounds of feeding stuff in a package, the name, brand, or trade-mark under which the article is sold, the name and address of the manufacturer or importer, and a chemical analysis stating the minimum percentage of crude protein it contains, allowing one per cent of nitrogen to equal six and one-fourth per cent of protein, and of crude fat, and the maximum percentage it contains of crude fiber, the several constituents to be determined by the methods adopted by the association of official agricultural chemists; provided that the statement of the percentage of crude fat may be omitted if it does not exceed three per cent, and that of the crude fiber if it does not exceed ten per cent. If the feeding stuff is sold in bulk at retail or put up in packages belonging to the purchaser, the agent or dealer shall, upon request of the purchaser, furnish him with the certified statement named in this section.

SEC. 4986. **Illegal sales; penalty.** A manufacturer, importer, agent or person who knowingly sells, offers or exposes for sale a concentrated feeding stuff as defined in section four thousand nine hundred and eighty-three without the statement required in section four thousand nine hundred and eighty-five, or stating that such feeding stuff contains substantially a larger percentage of either crude protein or crude fat, or substantially a smaller percentage of crude fiber than is contained therein,

shall be fined not more than fifty dollars for the first offense nor more than one hundred dollars for each subsequent offense.

SEC. 4987. A person who adulterates whole or ground grain with milling or manufactured offals, or with a foreign substance, or bran or middlings made from the several grains or the mixtures of wheat bran and middlings known in trade as mixed feed, with a foreign substance for the purpose of sale, unless the true composition, mixture or adulteration thereof is plainly marked or indicated upon the package containing the same, or in which it is offered for sale; or a person who uses in the manufacture of a compound feeding stuff, other than poultry feed, any wheat screenings or materials containing weed seeds to such an extent that the proportion of weed seeds shall be in excess of two per cent, by weight, of such compounded feeding stuff, unless a statement of such use of wheat screenings or materials containing weed seeds is plainly marked or indicated upon the packages containing the same, or in which it is offered for sale; or a person who knowingly sells or offers for sale whole or ground grain, bran or middlings which is so adulterated, unless the true composition, mixture or adulteration is plainly marked or indicated upon the package containing the same, or in which it is offered for sale; or a person who knowingly sells or offers for sale a compounded feeding stuff containing over two per cent, by weight, of weed seeds, unless a statement of such use of wheat screenings or material containing weed seeds is plainly marked or indicated upon the packages containing the same, or in which it is offered for sale, shall be fined not more than one hundred dollars nor less than twenty-five dollars for each offense.

SEC. 4988. **Appropriation; expenses; report.** The auditor of accounts shall quarterly draw an order in favor of the treasurer of the Vermont agricultural experiment station in payment of the expenses incurred at such station in compliance with the provisions of this chapter relating to concentrated commercial feeding stuffs, but the sum of such orders shall not exceed the sum of five hundred dollars annually. The director of such station shall annually publish a statement of the receipts and expenditures under the provisions of this chapter relating to such commercial feeding stuffs.

GENERAL PROVISIONS.

SEC. 4989. **Prosecutions.** The director of the Vermont agricultural experiment station shall, upon ascertaining a first violation of a provision of this chapter, forthwith notify the manufacturer or importer in writing and give him thirty days time within which to comply with the provisions which have been violated. If said manufacturer or importer fails to comply with such provisions within such time or violates the provisions of the preceding sections more than once, the director shall notify the

state's attorney of the county in which such violation occurred, who shall prosecute said manufacturer or importer; but there shall be no prosecution in relation to the quality of a commercial feeding stuff, a fertilizer or fertilizing material if the same is found to be substantially equivalent to the statement of analysis made by the manufacturers or importers.

SEC. 4990. **Collection of samples.** The director of the Vermont agricultural experiment station may, in person, or by deputy, enter premises where commercial fertilizers or feeding stuffs are stored, and take for analysis a sample not exceeding two pounds in weight from any lot or package of commercial fertilizer or feeding stuff including the exempted materials named in section four thousand nine hundred and eighty-four, which may be in the possession of the manufacturer, importer, dealer or agent. Such samples shall be taken from a parcel or number of packages which shall not be less than five per cent of the whole lot inspected, and shall be thoroughly mixed and placed in a suitable vessel, carefully sealed, and a label placed thereon stating the name or brand of commercial fertilizer or feeding stuff or material sampled, the name of the person from whose stock the sample was drawn, and the date and place of drawing. Such label shall be signed by the director or his deputy, provided that, upon request of the person from whose stock the sample is taken, such sample shall be taken in duplicate and carefully sealed in the presence of the person in interest or his representative, and one of such samples shall be retained by the director and one by the person whose stock is sampled. The sample retained by the director shall be for comparison with the certified statement named in section four thousand nine hundred and seventy-five or section four thousand nine hundred and eighty-five, as the case may be.

SEC. 4991. **Analysis of samples; publication.** Said director shall cause one sample of each kind of fertilizer or feeding stuff collected as provided in the preceding section to be analyzed annually. The analysis of feeding stuffs may include determinations of crude protein, crude fat, and such other ingredients as it is deemed advisable to determine. The result of analyses provided for in this section together with such additional information in relation to the character, composition, value and use of such fertilizers or feeding stuffs as the circumstances may advise, shall be published in reports, bulletins, special circulars or elsewhere as often as is deemed advisable.

SEC. 4992. **Exception.** The provisions of this chapter shall not apply to persons manufacturing, importing or purchasing commercial fertilizer or feeding stuff for their own use and not for sale in this state.

SEC. 4993. **Obstructing director; penalty.** A person who hinders, impedes or obstructs the director or his deputy in the discharge of his duty as provided in the preceding sections of this chapter shall be fined not more than one hundred dollars nor less than twenty-five dollars for each offense.

CHAPTER 214.

GRIST MILLS.

Duties of Owner or Occupant.

SEC. 4994. **Rates of toll.** An owner or occupant of a grist mill shall keep posted in a conspicuous place in such mill a notice of the rates of toll demanded for grinding each kind of grain.

SEC. 4995. **Same; penalty.** An owner or occupant of such mill who neglects to comply with the requirements of the preceding section shall forfeit three dollars for each month's neglect, to be recovered by any person, with costs.

SEC. 4996. **Exacting illegal toll; penalty.** An owner or occupant of such grist mill who exacts a greater amount of toll than is set forth in such notice shall forfeit three dollars to the person injured.

SEC. 4997. **Recovery of forfeitures.** The forfeitures accruing under this chapter may be recovered in an action on the case.

CHAPTER 217.

EVERGREEN TREES.

SEC. 5012. **Dealers.** A person, firm or corporation that buys or sells more than twenty evergreen trees in any one year of less than six inches in diameter at the butt as cut, not grown upon his own land, shall be deemed a dealer in evergreen trees.

SEC. 5013. **Licenses.** A person, firm or corporation shall, before becoming a dealer in evergreen trees, procure a license therefor as provided in this chapter.

SEC. 5014. **Same; fees; form; term.** A dealer in evergreen trees shall pay annually a license fee of fifty dollars to the clerk of the county in which he does business; and said clerk shall, upon the receipt thereof, issue a license to said dealer as follows:

State of Vermont,
County of..................

Be it known that license is hereby granted to A. B., on application, to be a dealer in evergreen trees in this state for one year from date hereof, and he has paid therefor the sum of fifty dollars.

Given under my hand this............day of..........
19.........

....
County Clerk.

Such license shall be in force one year from the date thereof.

SEC. 5015. **Registration.** The county clerk shall register in a book kept for that purpose the number of each license granted, the name and residence of the licensee, the time granted, the date and the sum paid therefor.

SEC. 5016. **Disposition of fees.** All moneys received by county clerks for licenses granted under the provisions of this chapter shall be turned over to the treasurer of the county where granted, and shall be used for the general purposes of the county.

SEC. 5017. **Becoming dealer without license; penalty.** A person, firm or corporation that becomes a dealer in evergreen trees without procuring a license therefor as provided in this chapter shall be fined not more than three hundred dollars, and each sale shall be construed as a separate offense.

REPORT OF STATE FAIR—1909.

The third annual exhibition of the Vermont State Fair was held on the grounds belonging to the State, at White River Junction, September 21-24 inclusive. The programme, which had been carefully prepared in advance, was carried out with the exception of a few features which had been arranged for Friday the 24th.

The amount paid out for premiums, including racing, was $17,665.33 and the sum of $6,772.12 was expended in permanent improvements on the grounds and buildings.

Rain interfered with the attendance on Thursday and Friday, the 23d and 24th.

Cheap rates on the different railroads entering White River Junction, and numerous excursions from distant points, had the effect of drawing the patrons of the fair from all points of the State, as well as from neighboring States and Canada.

In the horse classes the entries were considerably in advance of those of previous years. Morgans contributed about 100 head, and the class for those "Other than Morgan or Standard Bred" was well filled. The showing of Standard Bred horses was disappointing.

In all the more prominent classes of cattle, competition for the prizes was very keen, and while the total number of head present showed a falling off from the entries of 1908, the animals present were decidedly of a better grade, and made one of the finest showings on the track, when called for the parade.

In sheep classes there were about 500 head, and of the best. A look in this department could not help enthusing our farmers to more extensive breeding of sheep, and bring back our Vermont reputation as mutton raising for profitable business.

The showing of swine was first class in quality, but slightly off in numbers. This, no doubt, could be attributed to the market for pork, which induced owners to part with their stock.

The poultry exhibit was the largest ever held in New England, consisting of about 5,000 birds, and overflowed the accommodation provided. A new poultry hall 200 by 28 has been provided.

In the Horticultural, Dairy, and Domestic departments the exhibits were again very complete, and have outgrown the space allotted for them. New buildinggs for these departments will soon have to be constructed.

New buildings erected during the summer consisted of three horse barns, and the large shed for oxen. The latter had to be made over into a horse barn at the last minute and tents provided for the oxen.

An interesting exhibit was made by the State Forestry department, and the Experiment Station, which was an educator for the farmers.

The State Fish and Game department had a very interesting exhibit of at least twelve varieties of native fish. Probably more people visited the building housing this exhibit than visited any other department of the fair.

The vaudeville attractions were of a high class, and proved drawing cards by the well filled grand stands each afternoon.

The railway connecting the grounds with the town was in operation, and was well patronized. No accident of any kind happened to passengers or freight.

Respectfully submitted,
F. L. DAVIS, Sec'y,
Superintendent.

MAXWELL EVARTS, President,
Windsor, Vt.

VERMONT FAIRS FOR 1910.

State Grange................C. F. Smith, Master..........Morrisville

Vermont State Fair.

At White River Junction, September 20-23.

President....................Maxwell Evarts .... Windsor
Secretary....................F. L. Davis .... White River Junction
Treasurer....................Geo. E. Whitney.............Burlington

Vermont Maple Sugar Makers' Association.

(No date given.)

President....................George H. Soule .... Fairfield
Secretary....................H. B. Chapin .... Middlesex
Treasurer....................Homer W. Vail.............. Randolph

Vermont Jersey Cattle Club.

(No date given.)

President....................W. H. Vail .... Randolph
Secretary....................T. G. Bronson ....East Hardwick
Treasurer....................N. L. Boyden.................. Randolph

Vermont State Horticultural Society.

At Brattleboro, October or November.

President....................Geo. W. Perry .... Chester Depot
Secretary....................M. B. Cummings, ...Burlington
Treasurer....................A. M. Vaughan................ Randolph

Addison County Agricultural Society.

At Middlebury, August 30, 31, September 1, 2.

President....................Hon. John A. James ....Middlebury (R. D.)
Secretary....................Charles I. Button..............Middlebury
Treasurer....................Charles F. Rogers.............Middlebury

Caledonia Grange Fair.

East Hardwick, September 24.

President....................
Secretary....................E. B. Fay ....East Hardwick
Treasurer....................W. F. Field ....Hardwick

Caledonia Fair Ground Company.

St. Johnsbury, September 13, 14, 15.

President....................W. A. Ricker ....St. Johnsbury
Secretary....................Joseph Fairbanks ....St. Johnsbury
Treasurer....................Charles W. Ruiter............St. Johnsbury

Battenkill Valley Industrial Society.

Manchester, September 20, 21, 22.

President....................Douglas H. Dyer ......Manchester Center
Secretary....................William H. Benedict ....Manchester Center
Treasurer....................Charles L. Dench.. ....Manchester Center

Vermont Dairymen's Association.

President....................F. L. Davis ....White River Junction
Secretary....................F. H. Bickford ....Bradford
Treasurer....................M. A. Adams ....Derby

Franklin County Fair Association.

Sheldon Junction, August 30, 31, September 1, 2.

President	C. W. Gates	Franklin
Secretary	Geo. H. Dunsmore	Swanton
Treasurer	Geo. P. Twigg	St. Albans

Lamoille Valley Fair Ground Company.

Morrisville, Vermont, August 23, 24, 25.

President	Geo. M. Powers	Morrisville
Secretary	O. M. Waterman	Morrisville
Treasurer	O. M. Waterman	Morrisville

Union Agricultural Society

Tunbridge, September 26, 27, 28.

President	N. H. Austin	Tunbridge
Secretary	Geo. L. Swan	North Tunbridge
Treasurer	H. R. Hayward	Tunbridge

Dog River Valley Fair.

Northfield, September 13, 14, 15.

President	Geo. Tilden	Barre
Secretary	J. H. Winch	Northfield
Treasurer	H. C. Cady	Northfield

Valley Fair.

Brattleboro, September 27, 28, 29.

President	F. H. O'Connor	Brattleboro
Secretary	O. F. Benson	Brattleboro
Treasurer	F. C. Adams	Brattleboro

Orleans County Fair Association.

Barton, September 7, 8, 9.

President	H. T. Seaver	Barton
Secretary	C. E. Hamblet	Barton
Treasurer	F. D. Pierce	Barton

Springfield Agricultural Association.

Springfield, September 7, 8.

President	J. B. Reardon	Springfield
Secretary	Fred C. Davis	Springfield
Treasurer	W. D. Stearns	Springfield

Rutland County Fair.

Rutland, September 6, 7, 8, 9.

President	W. E. Carter	Rutland
Secretary	W. K. Farnsworth	Rutland
Treasurer	W. L. Davis	Rutland

Bradford Agricultural and Trotting Association.

Bradford, August 23, 24, 25.

President	H. W. Martin	Bradford
Treasurer	G. M. I. Wilson	Bradford
Secretary	H. Sargent	Bradford

Windsor County Fair.

September 13, 14, 15.

President	F. S. Mackensie	Woodstock
Secretary	C. J. Paul	Woodstock
Treasurer	C. H. English	Woodstock

OUTSIDE FAIRS.

Canada's Great Eastern Exhibition.

Sherbrooke, P. Q., August 27-September 3.

President....................William Morris ....Sherbrooke, P. Q.
Secretary....................H. E. Channell ....Sherbrooke, P. Q.
Treasurer....................H. E. Channell ....Sherbrooke, P. Q.

Colorado Inter-State Fair and Exposition.

Overland Park, Denver, September 3-17.

President....................John W. Springer ....Denver
General Manager..............H. Petrie .... .Denver
Secretary....................G. C. Fuller ....Denver

Rochester Fair.

Rochester, N. H., September 27, 28, 29, 30.

President....................Dr. Robert V. Sweet ....Rochester
Secretary....................Frank B. Maguire ....Rochester
Treasurer....................Col. Frank L. Kendall..........Rochester

Nebraska State Fair.

Lincoln, Neb., September 5-9.

Secretary....................W. R. Mellor ....Lincoln

West Virginia State Fair.

Wheeling, West Virginia, September 12-16.

Secretary....................George Hook ....Wheeling

Blackwell Inter-State Fair.

Blackwell, Oklahoma, September 20-23.

Secretary....................Ed. L. Peckham ....Blackwell
Assistant Secretary..........Malcolm McDonald ....Blackwell

International Live Stock Exposition.

Chicago, Illinois.

Secretary....................B. H. Heicle ....Chicago

Maryland State Fair.

Thirty-second annual fair.

Lutherville, Maryland, September 6, 7, 8, 9, 10.

Secretary....................Jas. S. Nussear ....Lutherville

Brockton Fair.

Brockton, Massachusetts, October 4, 5, 6, 7.

Blue Grass Fair.

Lexington, Kentucky, August 8-13.

Secretary....................Jouett Shouse ....Lexington

Winnipeg Industrial Exhibition.

Winnipeg, July 13-23.

Secretary....................A. W. Bell ....Winnipeg

Indiana State Fair.

Indianapolis, Ind., September 12-16.

Secretary....................Chas. Downing.............. Indianapolis

FARMERS' WEEK.

DOES IT PAY TO TEST ONE'S COWS?

F. WARREN WIGGIN, MANAGER QUECHEE FELLS FARM, QUECHEE, VERMONT.

The question assigned to me is, "Does it Pay to Test One's Cows?" I have nine reasons to state why it does pay.

There is no business conducted in the State of Vermont or any other State that is susceptible to so great losses and profits as is the dairy business, the producing of milk, cream, or butter. What is the reason that there is such a discrepancy between the results of one man's work and the results of another man's work? The average production of the cows in the United States is 142 pounds of butter fat per cow per year. If that were made from four-percent milk it would mean a production of 3,000 pounds of milk per cow per year, and that is a little less than the average production of milk.

The first reason that I state why it is best to test our cows is because it enables us better to detect the "star boarder." There is scarcely a herd of cows in the State of Vermont but what has a "star boarder"; by which I mean a cow that does not pay for the hay and grain which is fed to her during the year. There is no other way by which you can detect that boarder except by testing that cow's product and figuring up the cost of what that cow consumes. I shall meet some man who will say he doesn't want any man to tell him what his cows are doing. A gentleman came into my barn the other day who had a lifelong experience in handling dairy cows. There were 44 cows standing in my barn and I asked him to pick out the best cow. Finally he picked out a cow, and the one that he picked out stands in the year's work as No. 19, and I told him so. I then showed him the best cow in my herd and he looked at her and asked what she did, and I told him that she produced 401 pounds of butter fat last year; she is fresh now for about twelve days, and seven days after she was fresh she tested 5.8 percent and she will test better than seven percent this year and will give 500 pounds of butter fat. There was a man who thought he knew the best cow. It pays you to pick out the "star boarder"; and testing your cows is the only way you can do that.

Another reason why men lose so much is because they do not get economic producers of butter fat. The feed consumption of a cow is an important item, as important as is the production

of the cow. How do you know what a cow is producing unless you test the milk and feed that cow in accordance with that test?

Another reason is because it elevates the keeping of cows from the humdrum monotony of milking, feeding and cleaning out the barn, to a profession. We want to get the idea into the heads of the boys of the State of Vermont that intensive dairying which leads to intensive farming is not a humdrum life, but one worthy of attention by the best boys, men and women that Vermont produces. Dairying is a business conducted on economic, scientific principles, and this is the only way by which you can make your dairying a success.

When you test your cows watch their maternity and their progeny, for a large part of the future success of a calf as a dairy cow depends on the way it is handled for the first twelve months of its life. I like to see calves that are thin on the shoulders, thin in the hips, but rounded out in the body.

Another reason for testing your cows is that it promotes better care of them, better feeding methods of the cows, better stabling and better results. I wonder how you men take care of your gasoline engines and mowing machines? I am glad that there is a great deal less use made of the Almighty's store-house in Vermont than in the West. I have had four year's experience in the West, and it is something to make an eastern man's heart ache to see their farm machinery housed out with the great, grand, blue sky or with the rain clouds overhead. It is a cheap store house, so far as getting into it is concerned, but a mighty dear one so far as getting out of it is concerned. It is just the same way with the care of cows. I was in a barn the other day which afforded such poor protection that I wanted to ask the Society for the Prevention of Cruelty of Animals to examine that man's barn. I will venture to say that the man who joins the Dairy Test Association and has that official test once a month, and begins to find out what this and that cow is doing, will be ashamed of himself for trying to appropriate a little of the Almighty's store house, and will begin to keep those cows in better shape. I think if there is any one doctrine that ought to be preached in the State of Vermont, it is the doctrine of the man with a heart full of love for his cows; and that is the very thing which this test association will do, for if his cows are worth testing they are worth better care and a better food ration.

Another reason is that testing lightens the labor, lessens the feed bill and increases the profits. It lightens labor because it will cause you to sell about one-half of your cows that are "star boarders,'' and then you get more profit from the cows you have left than you do from all the cows you are keeping now. The State of Vermont can make an advancement in the next five years that will result in putting two cows into the hide of one. Which would you rather do, milk 22 cows and make $16 or milk 11 cows and make $36? Testing is the only way to discover

the thief and the robber in your herd. We have laws in the State by which we send out men to track down certain thieves. There are men in the State today whose cows are robbing them 365 days in the year; yet if they get up tomorrow morning and find that some one has gone into their hen coop and stolen their half dozen hens worth perhaps $3, they would get an officer out after the thief and the hens. Yet this loss is but a fraction of that which their old cows are losing them during the year; but they never think of putting an officer on her track. It would be a money maker for the State of Vermont if there was a law on our statute books that compelled the cows in this State to be tested, giving outright to the butcher all the cows that were robbing their owners. This State apprehends the two-legged criminal; why not take the four-legged one? At the end of one year's time the dairy cattle in the State of Vermont would be worth more than today, and the farmers would make more money.

Testing enables you, if you are separating your milk at home, to determine whether your separator is skimming clean or not. There is many a man who kicks at the end of the month at the check he receives from the creamery. You ask him how much it ought to be and he does not know. You ask him how much butter fat there was in the milk that his cows gave for the last month and he does not know. That man should not kick against the results from the creamery. You must know how much butter fat comes from your cows before you have a basis for and a reason to kick. Do you know there is sometimes a large mechanical loss in a separator? You ought to test the skim milk from your separator at least once a week. If a man tests his cows, and the cream does not show up the way it should, he knows there is trouble in his separator. When a man belongs to the test association it enables him to keep tab on the creameryman's test. You do not perhaps need to, but both you and the creameryman feel better if you do it; and it is only business to know whether you have the things you have paid for.

Another reason for testing is that it increases the value of every heifer, cow, and calf that you have for sale, because you have a record of what your cows are doing. I had a cow make 401 pounds of butter fat last year. She dropped a bull calf. A man came into the barn and asked what he could buy that calf for; I told him $5. He said that he never had paid more than fifty cents or a dollar for such calves; but when he found he could not get it for that, he finally pulled out a five dollar bill and took the calf. The record of that calf's mother was worth $4 or $4.50 to me.

The greatest profit that comes from joining a dairy testing association lies in the fact that it sets men to thinking along the right lines. You can not figure that out in dollars and cents, but the men who are making money out of cows are the men who are thinking about their business. If a man has not got any possessions lying in the region above his ears, he had better not go

into the dairy business; but if he has some gray matter that is pretty active and lively, he is all right for the dairy business.

Do you remember the result of that test reported in "Hoard's Dairymen" some time ago, made among 100 men in the State of Illinois by the University of Illinois; that out of those 100 men, the 61 who made any money at all off their cows were all of them men who subscribed for and read some of the latest dairy literature that could be procured, while the 39 who did not make anything out of their herds were men who did not want to know things? The 61 men averaged $1.41 for every dollar they paid out, and the 39 men, 94 cents for every dollar they paid out. We need to get down where we can reason out this question of a cow and her progeny, her feeding and development. I have a calf down in my barn that was dropped the 14th of November, and there is capacity in that calf. You have got to reason those questions out. I do not want calves that are fat, but I want them to have a good appetite and I want to see a paunch on them so they can carry some fuel.

I am going to give you some examples of my own herd: You will find a list of 25 or 30 and their production for 1907, and then you will find those same cows and their production for 1909. You will find that they have increased their yield all the way from 40 pounds to 150 pounds apiece, and it has been done by finding out the capacity of the cows and feeding them accordingly. I will give you a few figures on some of our cows; grouped two together, of about the same milk production:

Cow No	Lbs. of Milk	Lbs. of Butter Fat	Return per $1 of Feed	Charge per lb. for Butter Fat
97	664	30	$1.27	$.28
59	656	42	1.80	.1975
7	497	26.3	1.25	.29
91	484	33	1.56	.23
Violet	895	39	1.80	.21
Brownie	724	47.35	2.04	.175

No. 97 and 7 of this group, although stated as profitable cows, are too low in test and make too small a return for each dollars' worth of feed. They fail to measure up to my standard, even though giving more milk than the cows with which they are grouped. How could I have found this out except by the Babcock test?

SOME PROOFS FROM OUR OWN HERD.

Cow No.	Butter fat 1907	Butter fat 1909	Gain.
3	229	330	101
4	113 (8 mos)	248	135
5	185	275	90
6	231	287	56
10	170	275	105
11	193	293	100
13	269	290	29
19	213	279	66
29	230	301	71
31	261	345	84
34	203	272	69
35	258	339	81
36	260	319	59
38	294	400	106
40	290	350	60
41	195	258	63
43	229	269	40
84	150 (9 mos)	278	128
88	177 (9 mos)	311	134

Average per cow 1907—206 pounds of butter fat.

Average per cow 1909—265 pounds of butter fat.

In December, 1908, when we began to test, we were milking 48 cows. After we began to test we began to sell off the cows, until we got down to 38 cows, which gave us a cream check of $82 more from ten less cows. The other ten cows have gone to Ohio. Reckoning their feed at $7.50 a month would be $75 for the keeping of the ten cows for one month. There is a net gain of $157, in one month's time; and the herd of 38 cows is the direct result of testing that herd and knowing what it was doing.

I will give you one or two facts from the White River Test Association: It has shown that it reduces the cost of butter fat ten cents per pound to the members of the Association, that is, that it costs them ten cents a pound less to produce it, making the butter fat cost 20½ cents per pound the year through. One man's cows brought him a profit of $90 in one month at the end of the year as against $16 the first month. Another man had 25 cows. The test association got after those cows and the man sold 13 and made more money with the 12 left than with the 25 cows.

Does a test association pay? I want to refer to one other item as evidence that it does. In the little country of Denmark where the first test association was formed in 1895, the average test per cow was 112 pounds only in 1894. They made the choicest selection from their own herds and developed their cows,

and now Denmark has upwards of 500 test associations and the average production in 1907 was 225 pounds of butter fat per cow—more than double during the time that the test association had been at work there.

These are the simple facts bearing upon this one question, "Does it pay to test our cows?" I am glad there are seven test associations in the State of Vermont, and I am glad that there has been organized a dairymen's state cow testing association, which is to reach out and encourage farmers to co-operate in the organization of dairy testing associations. By culling out, selling, and giving away the unprofitable cows that are in the different herds of the State of Vermont, in two years' time we may double the production per cow and we may double the value of every dairy in the State of Vermont.

MILK BACTERIA.

H. A. EDSON, PROFESSOR OF BACTERIOLOGY, UNIVERSITY OF VERMONT.

Milk, as it is secreted in the glands of the cow, is free from bacteria; but it is seldom possible to draw it from the udder in sterile condition. Even if when freshly drawn it contains no bacteria, the present methods of handling milk are totally inadequate to exclude these organisms, which everywhere abound. The successful dairyman should understand the sources whence milk bacteria come and adopt methods which tend to reduce their numbers.

The first source is the *udder*. While the milk starts from the glands in a sterile condition it may become infected with bacteria within the udder. A small amount of milk necessarily remains in the teats after milking. Bacteria enter the teat from without and feed upon this retained milk, which at body temperature is a most favorable medium for the development of germ life. Certain groups of bacteria in particular find these conditions so well adapted to their growth that they are almost invariably present within the teat channel. The first few streams of milk which are drawn contain many more bacteria than do the last streams, because they are washed out more or less completely during the process of milking. The number of organisms thus introduced is comparatively small and they are certainly unimportant, for those derived from other sources usually outstrip them in rapidity

of growth and kill them. This group of organisms is beyond the control of the milker and need not be considered of great practical importance.

A second source is from the *exterior of the animal.* This source of contamination, like the others I shall discuss, is very largely within the control of the milker. If one were to take a single hair from the flank of a cow, thoroughly wash it in sterlized water so as to be free from bacteria, and then, by the usual laboratory methods, determine the number of bacteria which had washed off from the hair into the water, he would discover thousands, perhaps millions. These plants are so minute that tremendous numbers can group into a space too small to be seen by the naked eye. While the action of a single one is insignificant, the combined influence of many millions is great. Moreover, bacteria possess remarkable powers of multiplication. Their process of reproduction is very simple. The adult merely splits in two, by a process called fission, and forms two infant bacteria. I have repeatedly seen bacteria grow from infancy to adulthood and complete the process of division all within a period of thirty minutes, and it is known that under favorable conditions some species are able to reduce this time to twenty minutes. With division occurring every half hour, a single individual would become in one day the ancestor of 280,000,000,000,000 bacteria. Those with mathematical inclinations will find it easy to verify these figures. The average bacteria is about one twenty-five thousandth of an inch in diameter and about twice as long as it is wide; yet if we were to allow one single organism and its offspring to the last generation to go on reproducing once in thirty minutes for five days, its progeny would form a mass of bacteria large enough to fill all the oceans of the earth to a depth of one mile. Of course this rate of multiplication never continues for any great length of time in nature, because bacteria are extremely sensitive to unfavorable conditions, and they seldom find an ideal environment. Moreover, the products of their own growth soon accumulate in sufficient quantity to check their continued development.

One can form no adequate conception of the figures just given, but they may serve to show why bacteria are such important agents in influencing the quality of dairy products. Milk is an ideal medium for feeding bacteria, and if the temperature is sufficiently warm these organisms grow in it with great rapidity. It is therefore easy to see that the few hairs brushed from the flank of an animal into the milk pail would tremendously increase its bacterial content even though the hairs can easily be removed by the strainer a few minutes after entering the pail. What is true of the hairs is equally true of dandruff and dust which is brushed off by the hands and arms of the milker.

The third source from which bacteria enter milk is *manure and litter.* Such material is much richer in bacteria than are the dust and dandruff of the cow. Moreover the bacteria which are

likely to be present therein frequently belong to the more objectionable classes. Many of them produce changes in the milk which result in the formation of large amounts of gas. When such milk is fed to infants or invalids, colic and sour stomach are likely to follow. When made into cheese, ill flavored and gasy curds are obtained. Butter made from such material is of poor flavor and does not keep as well as it should.

The fourth source which we shall study is *barn dust from straw and hay*. This material is heavily charged with bacteria, many of which are in what is known as a resistant condition or spore stage. Some species of bacteria are able to produce spores. Spores are bodies which in some respects answer the same purpose for these organisms as do seeds for ordinary plants. By means of these bodies the organisms live through unfavorable conditions. The corn plant is killed by being dried out, but the kernel of corn is not injured in the least. The corn plant is injured by a frost, but the seed is not injured in the least by a severe freezing. Moreover the seed can be subjected to a higher temperature than the growing plant. The same is true of spores. Many of the bacteria which are present in the barn dust exist in this stage, but as soon as they fall into the milk pail they germinate and start up active growth once more. After a period of multiplication they again form spores which are often a source of serious trouble in the condensing and bottling factories. The actively growing bacteria of milk may be killed by the pasteurizing or sterilizing process to which these goods are subjected; but it is very diffcult to kill spores, and, after the milk has been shipped from the factory, they assume active growth and cause the product to spoil. If you feed your cattle just before milking, inevitably the air of the stable is filled with dust which is laden with countless numbers of bacteria. During the process of milking many of these organisms must settle into the milk pail. It is therefore much better from the standpoint we are now occupying to follow the practice of feeding after milking rather than before milking.

The fifth source which we shall consider is the *hands and clothing of the milker*. This is a source in which may lie no uncertain element of danger to the public. While the majority of milkers introduce no disease-producing bacteria in the milk, it is possible for a typhoid convalescent to become a menace to public health, if he is employed about a dairy. Typhoid fever is a disease which is caused by a specific bacillus. It is impossible for this disease to develop unless the patient has been infected by this particular organism, which lives for a time in his alimentary canal. One who recovers from typhoid fever may carry the organism about for a considerable period; indeed, in rare cases, for years. Ordinarily a recovered patient ceases to be a source of danger after an interval of time, but the typhoid organism is likely to be present on the hands of the convalescent, and if he is employed about a dairy a few organisms may find their way into

the milk pail. Unlike some other patheogenic or disease-producing germs, typhoid fever bacteria multiply very rapidly in milk. If a single organism were introduced into a quantity of milk it is altogether probable that within a few hours the entire amount would become infected, so that persons using it would be endangered and the more susceptible would undoubtedly contract disease in this way. Those who are interested in the production of market milk should exercise extreme care on this point. There are several authentic cases of typhoid epidemics which have been traced directly to typhoid fever convalescents on dairy farms, which were supplying milk for public consumption. Scarlet fever is another disease which is apt to be scattered about in this same way.

We shall next consider *milk utensils and strainers.* Any pail or vessel which has contained milk will certainly be infected with large numbers of bacteria which are not removed by the ordinary methods of washing. The only way in which a milk pail may be freed from bacteria is by thorough sterilizing by steam under pressure. Ordinarily, however, if the pails are thoroughly washed and then scalded with a generous quantity of boiling hot water, the number of bacteria which remain is small, and likely to be a source of no special annoyance. Pails should be treated in this way after each milking. A thorough scalding of the pails in the morning and merely rinsing them out with cold water at night is an unfortunate practise. Not only will the cold water leave large numbers of bacteria in the pail but, also, a sufficient amount of milk to furnish food upon which they can multiply, so that by the next milking time the pails are heavily infected. Occasionally there are special troubles which can be traced to the improper care of the milk pails. Cases are occasionally reported to us, in which the milk turns red, or becomes ropy, or undergoes some peculiar change a few hours after it has been drawn. At the time of milking it appears to be perfectly normal in appearance and taste, but within a few hours the peculiarity will appear. These troubles are due to the growth of particular kinds of bacteria. For example: the slimy milk, which must not be confused with garget, is caused by the development of an organism which lives over from milking to milking in the strainers and in the crevices of the pails. This is one of the spore-producing organisms and its spores are not killed by being immersed for a considerable time in boiling hot water. If troubles of this sort occur, the strainers should be burned and all utensils which come in contact with the milk must be thoroughly sterilized either by long periods of continuous boiling or, better, by superheated steam under pressure. Occasionally it may be found that some individual cow in the herd has become infected with the organisms and is carrying it about in her teats, but ordinarily a thorough sterilization of strainer, utensils, etc., does away with the trouble.

The question is often asked whether the milk of a diseased cow

is fit to use. For example: is the milk of a cow suffering from tuberculosis a source of danger to the consumer of the milk? There can be no question but that such an animal should be held under suspicion. If she is suffering from tuberculosis of the lungs only, she may not necessarily be a source of danger, but if the disease has attacked the udder there is no possible way to avoid contaminating the milk. It will surely contain germs of tuberculosis. It is altogether probable that the larger part of the cases of intestinal tuberculosis among children originate from the use of such diseased milk. If the animal is suffering from intestinal tuberculosis, or if other organs which may contribute secretions to the intestines are diseased, the bacteria will be present in the manure, and it is almost inevitable that certain of this material will at times find its way into the milk pail. Moreover, if hogs have access to the manure heap they can acquire the disease and themselves become unfit for use. In pulmonary tuberculosis bacteria are expelled from the lungs in fits of coughing, and may be spread about the stable and upon the hair of the cow from the tongue. The tuberculosis organism is not killed by drying, so that if infected stable dust gets into the milk it becomes a source of danger. The only safe rule for the dairyman who wishes to produce sanitary milk is to have his animals tested and to dispose of those which respond.

Of these common sources of milk bacteria, all but one, the udder of the cow, are under the direct control of the dairyman, and it is possible for him to reduce the infection to a minimum number. I am aware that the complete elimination of bacteria from milk would cost much effort and expenditure. I believe it is impossible to eliminate all the bacteria at the present price of milk and get your money back; but a large majority can be excluded without material increase in the cost of production. On any ordinary Vermont farm it ought to be possible to produce milk that will keep from five to seven days without souring, provided it is stored at a temperature of 45 degrees F. or thereabouts.

As a final summing up, the precautions looking to a general reduction of the number of bacteria in milk are: (1) Wash and sterilize all milk utensils with more care than is ordinarily used. (2) Keep the cows clean. (3) Moisten rather than brush the udder and flanks before milking. (4) Clip the hair on the udder and hind quarters. (5) Use covered milk pails, kept exclusively for the purpose. (6) Never allow milk to sour in the pails, and always scald them thoroughly after each milking. (7) Cover cans tightly when filled. (8) Keep stalls and stables clean. (9) Cool the milk nearly to the freezing point as soon as possible after drawing. (10) Keep the stable ceiling free from dust, and have it tight so as to prevent chaff and dust sifting through. (11) Have the hands and clothing of the milker clean. (12) Discard the fore milk where extra precaution is desired. (13) Remove milk from the stable immediately after drawing.

MODERN MILK MAKING.

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There are three phases of milk production that I wish to emphasize:

(1) The production of milk as an economic factor of farming.
(2) Milk as a food.
(3) Its relation to the public health.

The economic phases of dairying rest upon various factors. A great many of us adopt dairying or go into it as an inheritance and never stop to analyze the business principles as to why we are dairying.

To bring the matter before you in a comprehensive way it will be necessary to throw out a few suggestions as to why dairying is practised. In the first place it is one of the oldest of our agricultural institutions; it has been very closely in attendance upon the development of humanity; in addition, it is the only class of farming which regularly provides a daily, weekly, or monthly revenue. There is no other class of farming that will provide a revenue with the regularity that dairying does. That, in connection with the fact that mankind is unable to finance its affairs successfully in the absence of a regular income, is one of the reasons for the popularity of dairying. Take, for instance, Aroostook county in the State of Maine, where the farmers are so occupied with growing potatoes they cannot produce milk or eggs, but purchase them from western states. Because of fluctuating crops, Aroostook farmers alternate between a feast and a famine. There is no reason for the famine, because the aggregate of the production of the potato crop is sufficient to provide an ample revenue, but it is due to the inability of potato growers to finance their affairs in the absence of a regular income.

Another factor in dairying is the opportunity afforded thereby for the concentration of otherwise bulky agricultural products, particularly hay and other coarse food products. By converting the hay into milk, cheese, and butter, you concentrate the market value of hay, etc., into smaller bulk and are able to profitably ship further distances. The very bulk of hay limits its shipping capacity, because of excessive freight rates. Hay cannot well be shipped more than a few thousand miles, whereas a pound of butter can be shipped around the globe. This ability to concentrate farm products finds its greatest expression in butter and cheese.

Another factor is the ability to prepare for marketing, products of inferior value. That applies more particularly to hay. Although every farmer prides himself upon the herd's grass he can produce, after all is said and done the average production

of No. 1 quality timothy in New England is very small, not exceeding twenty or thirty percent. of an optimum crop. With hay, as with everything else, immediately you depart from the quality of the product the price drops. That is particularly true with the lower grades. It is so with potatoes, apples or any other crop. If first grade is selling for $20 this year, inferior grades rate even down to $10 or $8, sums so low as to make it utterly impossible to derive profit from its sale, as hay. Not, so however, if it be converted into dairy products. By so doing the price received would not be $8 or $10, but would be nearer $13 or $14. Of course you also want to bear in mind that you are selling with each ton of hay about $4 to $5 worth of fertilizer from the land, whereas in selling milk you would be removing from the land but about one-fourth or one-fifth of the fertility; while butter carries but a mere nominal amount of plant food. Hay is of inferior value, largely because of its physical condition, the market requiring a coarse hay. It is not poor in any other sense. Hay that is musty, that is produced from over ripe grass, or is otherwise injured, is another thing. Such hay is a discouraging proposition; is in a class by itself, and is to be avoided as far as possible. There are also other economic factors of similar purport that will suggest themselves to you.

This brings us to the consideration of the cost of the production of milk, which is dependent upon various factors. Grouped into three divisions these are:

1. The individuality of the cow.
2. The feeding or care of the animal.
3. Other incidental expenses peculiar to the business.

As regards the type of cow, I take it for granted that it is not necessary to say very much. I have arrived at that point where I have no particular preference for any breed. All that I look for now is a cow, irrespective of breed, that is able to produce sufficient milk for her keep and leave a profit. You will find profitable cows in all breeds, but the point to strive for is to separate the unprofitable from the profitable producers. As to the methods of doing so, I simply refer you to the teachings of your department of Animal Husbandry and Dairying at the University. Of course the herd tests, the cow test association work that you are conducting in Vermont are also for that purpose. However, in the selection of animals, one should consider the nature of the output, whether it is to be butter, cheese, or market milk. The champions of the Holsteins are at the present emphasizing the great qualities of that breed. But the Holstein people err in distorting the facts a little too much in their efforts to create an interest in the breed. The demand for Holsteins does not arise because of the superiority of the milk. Quite the contrary, for the milk of Holsteins is low in nutritive value. But it is a cheap milk. That is wherein it finds favor. Holsteins are, moreover, forced upon dairymen by the attitude of the city milk contractors, who,

with few exceptions, ignore and refuse to admit any possible difference in milk, treating all milk alike.

You are, perhaps, familiar with the contractor's methods. You have not got to travel very far in Vermont but what you will find two farms. One shows the result of years of application in the breeding up of a herd of high productive capacity, as measured by the nutritive quality of the milk. Across the way is a man who has exactly the opposite ideas, if he has any at all. He is careless, is always doing a thing at the wrong time, and neglects his stock and family. Along comes Mr. Milk Contractor to buy milk. He offers exactly the same price for the milk produced under those greatly varying conditions. Now, that, carried to its logical conclusion, inevitably produces but two results. First, it causes the production of a milk low in food content, because it is a recognized fact that, other things being equal, animals producing milk low in food value produce larger quantities, on the same food, than is produced by animals producing a richer milk. And secondly, it results in lowering the standard of cleanliness.

The people in the cities receive milk of low food value and of high infection, and rebel at the cost thereof, ascribing all blame to the indolence of farmers; whereas it is a matter beyond the control of the farmer just because of this attitude of the milk contractors in not conceding any possibility of a difference. So you see, from the economical phases of the question, the matter of the selection of breed is of some importance when bearing in mind the final product, whether it is milk, cream or butter. If you are shipping milk to the cities you ought to have Holstein cows. On the other hand, if you are going to produce butter, cream or cheese, you should select animals bred to produce milk of high butter fat and solids content.

One phase of the cost of production, as published too frequently, is worthy of careful consideration. We are placed at a disadvantage by the statements printed in the daily and dairy press regarding the cost of production of milk, because such statements, as a rule, are incomplete. They are generally confined to food cost alone, ignoring other factors, such as labor and incidentals. The attitude of the daily press along these lines is particularly unfortunate, because it seizes these reports where costs are computed solely on the food basis, and spreads them broadcast through the land, creating the impression that milk can be produced for two or two and one-half cents a quart, whereas such a proposition is so absurd that it seems almost useless to take time to discredit it. A great deal can be accomplished by letting the consumer know the real state of affairs. It is a reasonable attitude for the consumer, if a newspaper prints a little clipping from some agricultural source stating that it costs from two to two and one-half cents to produce a quart of milk, to suppose there is graft somewhere, when he is asked to pay five of six cents a quart for it. To show the importance of cost factors, other than food,

I have prepared this table. Assuming there is a farm devoted exclusively to dairying, requiring, the following investment, we may have something as follows:

Forty acres at $75	$3,000.00
Barn and stable	1,200.00
Sheds and ice house	300.00
Tools	600.00
Three horses	500.00
Twenty cows	1,100.00
Bull	50.00
Cash	300.00
	$7,050.00

From the foregoing figures the following expenses result:

Five percent on investment		$352.00
Taxes, 10 mills on one-half value		35.25
Insurance, one-half percent for three years		15.00
Repairs		150.00
Depreciation of horses	$ 50	200.00
Depreciation of cows	150	
Depreciation of tools		60 00
Two and one-half percent mortality		22.00
Service—keep of bull		60.00
Total incidentals		$894.25

For a dairy of twenty cows this $894.25 will amount to $44.71 per cow annually. These figures are merely tentative. They will vary with different individuals. Some of them may not manifest themselves annually, as for instance the item of repairs; but the longer you wait, the larger the amount, and distributed over an average number of years the item of $150 for repairs is too small. You must also bear in mind the nature of the work it is designed to execute in any given building. Dairying serves very quickly to depreciate the value of buildings. Consequently you may have buildings of concrete. Then instead of $1500 in buildings you will have to double this amount to have $3000 for the same equipment and lower your depreciation to five percent. The matter of depreciation on the horses and cows is too small. A depreciation of $50 on $500 (the value of three horses) is on the assumption that the horses are going to be useful for ten years, which is not apt to be true, although there are very wide variations.

When dairying is carried on close to cities it becomes very difficult to co-ordinate the demands of the consumers and the breeding of the cows. So rather than buy a cow or two at $75 per cow for the brief interval where the demand exceeds the sup-

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ply, the cows are temporarily overfed, with this result: that the average working life of a cow, under such conditions, is but a matter of a few years, perhaps not more than two or three years. At points more remote from the market, this pressure is not felt as keenly. A wider range of action and greater latitude exists, and the result is that the depreciation for such dairies is not as large as it is with those which are situated near cities.

But I wish to emphasize this large amount of $44.71 properly chargeable against each cow for incidental items of expense other than labor, food, etc., a charge which is practically ignored in all the discussions that I know of regarding the cost of milk production. Having established those facts, it is easy to determine the relative importance of these things in the cost of milk. Assuming the annual care of a cow to be about as follows.

Two tons of hay	$ 20.00
1680 pounds of grain	23.52
Bedding	2.50
Labor	28.00
Incidental charges	44 71
Total per annum	$118.73

we are able to measure the amount of expense caused by the incidental factors, other than labor, food, etc., which in this case is about 37 percent of the total cost.

Having established the cost of keeping a cow, the cost of milk is readily determined by dividing the former by the annual yield. The following table shows how this cost may fluctuate with varying yields of milk, although it must not be taken too literally, inasmuch as cows producing 3500 quarts of milk per annum usually require considerable more food than the cows producing but 2000 quarts. As the food given on the above schedule more closely approximates the requirements of 2000 pound cows, the cost of 3.39 cents per quart for 3500 cows is, for average conditions, too low:

2000 quarts of 5 percent milk	5.93 cents
2500 quarts of 4½ percent milk	4.75 "
3000 quarts of 4 percent milk	3.96 "
3500 quarts of 3½ percent milk	3.39 "

The foregoing figures refer to only cost of ordinary milk production.

Let us pass on to the matter of milk as a food. I simply introduce this to emphasize the last phase of the milk question, viz, its relation to public health. You want to bear in mind that milk as a food has been one of the dominant factors in the development of the human race. It is so because milk in itself is a complete

food, offering and providing all the elements required for sustenance. It is perfectly balanced, the most readily digested and assimilated of all food products.

Despite these facts, the true position of milk in its relation to public health is a matter of but recent demonstration. Up to twenty years or so ago there was little intimation of the very important position milk occupies in this respect. The importance thereof depends upon the fact that milk is the best food for a greater diversity and larger number of bacteria than is any other known product; and, as such, it may become a conveyor of diseases that assail mankind, such as typhoid fever, diptheria, scarlet fever; and even tuberculosis of the bovine type is included in this class by some investigators. In addition to these disease-producing organisms there is another large series of bacteria having the power of producing putrefactive decomposition. This class of organisms may produce in a human being rather severe acute types of indigestion, and is the main cause of the cholera infantum of bottle-fed infants. None of the germs, except those of bovine tuberculosis, are ordinarily resident in the cow. There is no reason why scarlet fever or typhoid fever germs should ever be introduced into the udder of a cow; but the putrefactive germs may be present in the udder, although only in negligible quantities. So that what we speak of as the udder infection is really a matter of no serious moment, with the exception above noted. Most all these mischief makers enter the milk from sources of infection to which it is exposed during the process of milking or the subsequent handling thereof, either by producers, dealers or consumers. It is not a difficult matter almost absolutely to control the entrance of the pathogenic germs, such as those of typhoid fever, diptheria and scarlet fever. All that is necessary is a recognition of the possibility of their presence, accompanied by the exercise of care to prevent their admission to milk. Thus tubs, etc., for washing, etc., should not be used in common; yet I have, in the discharge of my duties as health officer, found at the home of a milk dealer where typhoid prevailed, the same wooden tub used for washing the bed linen from the sick room as was used for washing the bottles in which milk was sold. The connecting link for an epidemic of typhoid, diptheria, or scarlet fever arising from milk always depends upon some such gross action or similar carelessness.

The other class of germs, the putrefactive, decomposing varieties, obtain their access to the milk through the dust or filth that gets into milk during the process of milking, such as particles of skin, dirt, or use of infected pails, etc. Such infection can be controlled by the exercise of cleanliness. The first step is so to arrange the work of the stable as to reduce the amount of dust therein to a minimum degree. This indicates the desirability of feeding after milking instead of before, the importance of grooming the cow and keeping her clean. While grooming a cow does not materially increase her yield, it adds to the cleanliness of milk, and

therefore is of great importance. Then the infection may come through careless washing of the milk utensils, or from the hands or clothing of the milker. You cannot wash your hands too carefully. An ordinary washing of utensils is not sufficient; you must sterilize them, and that is the only point where sterilization is necessary or should be admitted in modern milk making. All this of course means added expense; you cannot escape it. You will be surprised, when trying to produce so-called certified sanitary milk, to find your expenses will be more than fully doubled beyond such as are caused by milk production under ordinary conditions. As to whether it is practical, whether a strictly sanitary milk is useful or needed, we find that it is exceedingly so. We find, however, that its reception is delayed, partly because of ignorance on the part of consumers, and partly because of the persistent opposition of commercial interests now well entrenched in the field. I mean the milk contractors and all the existing methods in vogue for the distribution of milk. They are going to be able to undersell you, which with most consumers is a vital point. Furthermore, they have many more units of personal equation at their command. The man who attempts to produce milk of high grade has got to buck against the whole bunch. Various methods have been worked out to overcome this. One, the elaboration of the plan of certification of milk by milk commissions, has thus far been the most successful, yet it is not devoid of serious objection. The ordinary method is to prescribe rules and regulations under which the milk is to be made, and to take a sample of milk once a month for examination. If satisfactory, upon the strength of that exemination, a certificate is issued that milk of a satisfactory quality is being produced. But in so doing it represents a trifle over one percent of the total output of any one month. That would not be so bad if milk were a constant product, but by this method the fact is ignored that milk from day to day does not necessarily bear any resemblance at all, except in color.

There is another deplorable feature of such certification, viz.; the undeserved condemenation implied thereby that dairymen, collectively, are so deficient, ignorant and even dishonest, as to require certification to their ability to produce pure, clean, wholesome milk. Undoubtedly there are many careless milk producers, and the milk supply of cities, as a whole, is admittedly poor; yet nevertheless, this rests not upon the inability of some dairymen to produce good milk, but upon the difficulty of getting such milk to market. As previously stated, the cause for this is found in the attitude of milk contractors in refusing to recognize any difference in milk.

To sum up, we see that, first: modern milk production requires intimate knowledge of the underlying principles governing its production and all the factors affecting the cost thereof. Second; due regard is essential for the great importance of milk as a food, in order thoroughly to comprehend the far-reaching effect of milk in

its relation to public health. The extent to which these matters are understood and applied will largely determine the ultimate degree of success attained in dairying.

VERMONT AS A MARKET MILK STATE.

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This subject, on which I have been asked to talk, is one on which much could be said, but which I shall not try to handle completely.

Vermont's geographical location places her within the market milk zone of both Boston and New York. Her topography and soil also favor the milk business. The value of clean pastures and clean water in the production of clean milk should be considered by the milk buyers who seek good quality, and should be recognized by Vermont farmers as one of their assets. These conditions may be made of value to our farmers.

The people of Vermont as a whole are already well and intelligently established in the dairy business. If they were not already engaged in it, much time would be required to get them started; and if they were not an intelligent people it would be difficult for them to learn how to produce the clean milk which the city consumers are demanding.

We have, then, to begin with, a State which is within easy shipping distance of the large and rapidly growing cities. Greater New York is said to be growing at the rate of about 72,000 people per year, a small city every year added to that large city. That is one of the reasons why it seems to be such an insatiable market for dairy products. Given, then, a location within the market milk zone and a topography adapted to clean milk, with the people already in the industry, it is only natural to find a goodly number of buyers with milk-receiving depots established throughout the State.

What should be the attitude of the State toward this growing industry? Is it one to be encouraged or to be held in check? We hear it discussed wherever the State Dairymen's Association meets, and in all of the discussions that I have heard, the farmers are advised to keep the milk at home, to support the home creamery, to feed the milk on the farm and let the city people whistle. Unfortunately, we are often called on to face and discuss problems

that we wish did not exist, and perhaps this is one of those problems. I am convinced, because of the location and adaptability of Vermont for market milk and the great and growing demand in our large cities, that the time is almost in sight when the cheese and butter factories of the State will largely be closed down from lack of support, although of course there will be here and there a factory located at such a distance from the railroad that the shipping of milk will not be feasible, which will continue as such indefinitely. If, then, the farmers are to be called upon to solve the problem as to whether they shall or shall not ship milk, let us see how the matter stands.

During the year 1909 the average price paid for milk in Vermont was about $1.75 per hundred when it was to be shipped for use as milk, and about 32 cents a pound for butter fat at the creameries. In which way can we get the most out of our milk? Assuming four percent milk, a hundred pounds would carry fat to the value of $1.28; and if a 30 percent cream is delivered there would remain on the farm about 85 pounds skimmilk. What is the value of skimmilk? That is something on which there is wide disagreement. Skimmilk is valuable just exactly in proportion to the work it will do. Fed by itself it has been shown that about sixteen pounds of skimmilk will produce one pound of pork, and if pork is worth nine cents a pound, skimmilk is worth 56 cents a hundred; or, rating it on the amount of corn it will replace, using figures obtained at the Wisconsin Experiment Station, 327 pounds of skimmilk will replace 100 pounds of corn when fed to pigs at the rate of one pound of corn to two or three pounds of skimmilk. If fed to older animals or in larger amounts, the saving is not so great.

Suppose, now, we practise a system of what I term "balanced farming," which, among other things, includes several kinds of animals. It will include the keeping of hogs, and on the whole will include that system of swine culture which allows two litters per year per sow. To get this maximum work from that animal is entirely possible; but in order to do so profitably milk must be fed to those little pigs that they may keep growing nicely after they are taken from the sow. To do this we must have skimmilk. I feel then, that it is entirely proper to assume that 327 pounds of skimmilk will replace 100 pounds of corn when fed to pigs in the most economical quantities. What then, is the value of skimmilk? Corn costs about $30 per ton or 84 cents per bushel. If that be the price, it gives us a value of 48 cents per hundred as the value of skimmilk. We have 85 pounds, or 40 cents worth, then left on the farm.

Again, there is the fertilizing value. Figuring the nitrogen, phosphoric acid, and potash at present market value, it gives us 13 cents as the fertilizing value of 100 pounds of skimmilk. We have only 85 pounds which will reduce it to 85 percent of 13 or 11 cents. However, only about 9 cents' worth of the fertilizing con-

stituents of the milk fed will be returnable in the manure. Adding these: $1.28 for butter fat, 40 cents for feeding value of skimmilk, and 9 cents for fertilizing value of skimmilk, we have $1.77 as the value of 100 pounds of 4 percent milk. Notice the close agreement between this figure and the average price paid for market milk. A less rich milk, say one testing only 3.3 percent fat, would be worth about $1.40, while a 5 percent milk is worth about $2.20 per hundred. Again, if the butter is made at home you have not only the skimmilk, but the buttermilk; so that a 5 percent milk, made into butter at home, will yield 95 pounds of milk feed. Figuring in the churn gain, selling the butter at 35 cents a pound, and the increased feeding and fertilizing value, it gives about $2.60 to $2.70 as the actual value of 100 pounds of such milk. If your milk tests over 4 percent you cannot afford to sell it to the contractor at the present market prices for milk. If it tests below 4 percent there is a question. To even this must be added the extra difficulty of raising heifer calves for the future dairy without milk, and the cost of raising pigs to use up the many by-products of the balanced farm. It will cost about as much to deliver milk daily to the station as to make the butter on the farm when the farm is near the station, and more if several miles away from the railroad. The question of daily delivery may become a very large item indeed. If you hire it delivered, there is a very definite extra expense. I have found in some sections that the farmers receive $1.90 per hundred with 10 cents off for collecting. It is certainly, then, a problem which each man must settle for himself, taking into account the question of the quality of the milk, the nearness to the railroad station, his ability to make butter, the nearness to the butter factory and the cheapness with which he may deliver to the market. In our own work at home in the West we had been patronizing the cheese factory and had from 500 to 700 pounds of milk a day. The cost of delivering that load was a large item. Then the cheese factory was converted into a butter factory, and finally we got a hand separator. A little orphan boy that we took in drove the old family mare, and it did not cost much to deliver that valuable stuff to the creamery. So the circumstances in each home must be taken into account. It is certainly unwise for any farmer to sell his milk for any less than he can get for it disposed of in any other way.

What will Vermont do in respect to market milk? I anticipate that one community after another will drop into line and sell milk to the big cities and that the price will gradually go up. I am doing what I can to place the cold facts before the farmer and the consumer, both in respect to the cheapness of milk as an article of food to the consumer, and the cost of production of milk.

What will the future be? I think that in a few years Vermont will be a market milk state, whether the farmers sell their milk for less than it costs them to produce or not; and whether or not they deplete their soil until they are nearly impoverished, until, in

fact, they become what many of the soils in Southern New York are said to be. I fear many localities will be in that condition, but I mean to do what I can to give the milk makers a full appreciation of the conditions that are confronting them, and, if possible, to induce them to get on to some such basis as this:

Let each community that has a co-operative creamery keep it and support it. If it has not a co-operative creamery, let it form a co-operative cream-selling association. Let each farmer guarantee to furnish so many pounds or quarts of milk per year and stop with that, with the understanding that if he runs short he must buy to make good his guaranty. Then, with the balance, support the local creamery or make into dairy butter. Maintain competition and maintain such a control over the work that the men in the cities will be compelled to pay some attention to the farmers' end of the proposition.

"WHAT SHALL I DO WITH THE COW I'VE GOT?"

R. M. WASHBURN, PROFESSOR OF DAIRY HUSBANDRY,
UNIVERSITY OF VERMONT.

No subject is more to the point at this hour and in this section than the question, "What Shall I Do With the Cow I've Got?"; for practically all New England is engaged in the dairy faming business. We hear much about the unprofitableness of this or that dairy and that the farmers support a large cow population that yields no profit. The records of the three cow test associations, that have completed a year's work in this State, show that twenty or twenty-five percent of the cows tested produce so little profit as to be hardly worth considering as money-making machines.

What shall we do with the cows we have? Keep them, for the present, and test them for economic production; and, while doing so, give them a chance to do their best.

We are accusing our cows of being money losers. We are their accusers, their prosecutors and their judges; and it is only fair that we be their defending attorneys as well, and give them a fair trial.

I am personally of the opinion that many of the cows we condemn would acquit themselves with credit if we had done our part. First, in feeding the calf and growing heifer in such a manner as to develop a strong, vigorous animal of good food-

taking capacity; second, in so breeding them that they could have yielded the major part of their milk while the price of milk or butter fat was high; and third, in feeding them such materials and in such quantity that economical work was possible. The poorly fed heifer does not develop a large enough machine for working over hay and grain into milk; and too liberal a use of grain during calfhood is nearly as bad. The winter cow has the advantage of a market from 15 to 25 percent better than the summer cow.

In respect to feeding, I note from the inquiries that we are receiving all the time, that most farmers buy grain in large quantities. These letters are apt to ask how to balance this ration or that. It is all right to balance the ration not only in respect to the proportion of digestible protein to carbohydrates, but also in respect to the proportion of grain to roughage and of total food to the size of the cow and the amount of milk she is giving; but it is now of greater moment that the farm itself be balanced. By cutting the herd somewhat and increasing the yielding power of our acres so that we may grow most or all of the carbohydrate grain on our farms, we then will be able to feed the cow for less dollars and the whole dairy proposition will be put on a firmer basis than if we are compelled to make money on purchased feeds. The soil of that great northwestern wheat country is becoming hungry and is being divided into small farms, on which the farmers are keeping cows. This tends to raise the price of bran. The great corn belt lands are also being cut up into smaller farms; its soils are getting tired and are producing less bushels of corn per acre than of old. This fact, with the increase of human, swine and cow population in that region tends strongly to maintain high prices for corn and corn products and for corn fed animals. Still further south, in the cotton country, they are raising more corn, but they are going into the dairy business also. Even Oklahoma, our youngest state, has now a farm family for every 160 acres in the state and is already making more butter than is needed at home. This all means that the price of feed has gone up to stay. Are we going to charge the $30 and $40 stuff to the cow or raise half or two-thirds of it for less money? It costs less to buy fertilizers judiciously and to produce corn in Vermont than it does to buy western corn and pay the freight from the West here. Conditions have changed to such an extent since the grain-buying habit commenced that I see no rosy future for the New England farmer until he produces more food at home to feed his cows. So I would say, raise the stuff at home in order that we may have a better article at less cost. This done and we shall find a larger proportion of profitable cows.

There are many points in the handling of cows with which we are all familiar. For instance, we all know that anything that excites a cow costs money; that cold weather makes a cow shrink

in milk; that they must be kept warm, either by the food digested inside of them or the clapboards outside of them. I have been in the corn country in the West where good sound ear corn was used as fuel. It would, at that time, create more heat than the value of that corn in coal. To observe the amount of heat that a bushel of corn would produce and then to appreciate that it would yield almost as much heat if digested within the cow, is interesting. A comfortable stable diminishes the cost of maintenance and increases the flow of milk. If a cow sleeps cold she will require more food or she will lose weight. A temperature of about fifty to sixty-five degrees is about right.

Again I wish to impress upon you the fact that the cost of feeds has gone up to stay; that the only way to bring that cost of production down is to rotate the crops on the farms, to feed the soil and to produce more from the soil. Then, with the well developed dairy-bred heifer as the working machine of the herd, with liberal feeding, kind handling and comfortable stables, there is a good future for this industry.

DAIRY BARN CONSTRUCTION.

H. E. COOK, DEAN OF THE SCHOOL OF AGRICULTURE OF ST. LAWRENCE UNIVERSITY, CANTON, N. Y.

My discussion of barn construction has not been popular in New England. I have been in all of the New England States talking barns, and this apparent lack of popular approval has been due to the condemnation of the underground stables. I do not believe in them. The only good thing about them is the protection which they give the manure, when compared to throwing it into a pile under the eaves. It is a physical impossibility to construct a sanitary barn and have fermenting manures under the live stock.

Under the most pleasing conditions, barn discussion is very unsatisfactory because of the great variety of local conditions which must be met. It may be better for one man to build a single story barn, and for another a two-story barn. It may be easier to care for stock where all of the feed comes down from above, and it might be easier to have everything on a single floor.

I believe in rectangular construction. Every movement in the building conforms better to a right angle than to a circle, and so the round barn seems to me to be ill advised. Its only advantage is

the fact that a larger area may be surrounded with the given amount of material than in rectangular form. This is, however, in my opinion of very little importance.

Our dairy cows must have comfort. The stalls they occupy must be easy, and the temperature must be warm and dry; otherwise there would be no profit even when milk sells at two dollars per hundred pounds. In order to secure the greatest comfort, we may yet blanket our cows as we do our horses.

The amount of space required for an average dairy cow is about 500 cubic feet. It does not necessarily follow that 500 cubic feet will provide pure air. The purity of the air will depend upon the sanitation of the room and the constant change of air. Five hundred cubic feet does, however, provide an amount of space which the average cow can from her bodily heat, warm to 50 degrees in our northern latitude and maintain a steady change of air and also provide sufficient floor space for economical care and management of the herd.

I would not have the ceiling to exceed nine feet from the floor. It may be less than that in small stables. The pure air in a building is near the floor, the foul and warm air near the ceiling. If artificial heat was provided, the higher the room the better the air, but this we cannot do in our commercial milk production.

The width of the stable for two rows of cows will vary from 36 to 42 feet. If we drive between rows and around them with the heads together, we will use 42 feet. Whether the cows should stand heads together or apart will depend upon local conditions. If manure is hauled by team direct to the field, driving into and out of the barn, heads apart, will facilitate the work. If we are soiling cows the year round, it will be easier to feed them from a common center. The width of the platform depends upon the size of the cows. Holsteins weighing from 1200 to 1400 should have five feet in width; smaller cows may stand upon four feet, ten inches and four feet, eight inches. The width will depend again upon the size of the animal, from three feet to four feet, probably an average of three and one-half feet will accommodate the greater number of cows.

The side wall construction is important. We must be economical and still have warmth and a wall which will not permit of condensation. Matched lumber or novelty siding on the outside with cheap matched lumber on the inside of the studs, with the space between filled with planer shavings with metal lath and cement plaster upon the inside, will constitute the best wall yet devised. It has every element of economy and efficiency. There seems to be a general impression that mice and rats will work in this stuffed wall; no trouble will follow with a concrete floor which cuts off any chance for entering the space from below. I have in use walls of this type which have served well for a dozen years.

Window space should never be less than four square feet per cow. It may be double this amount if double windows are put on

to prevent too rapid radiation of heat in extreme cold weather, in fact the double windows in northern latitudes are essential to prevent the usual frosting.

The floor is one of the most important items in stable construction. Cement is the best. Lay down a grouting of one part cement, four parts sand, and eight parts crushed stone, if crushed stone is available; if not, small field stone or gravel will serve the purpose. Wherever animal life is to come in contact with the floor, lay down three thicknesses of tar paper, single ply, and between each spread a coat of coal tar paint. Do not allow the paper to come to the edge of the gutter. Through this paper into the concrete below, drive spikes, 30 penny nails will do, allowing them to project above the paper about one inch. Upon this, spread the finishing coat made up of one part cement, and three parts sand, to the depth of 2 inches.

The cow platform should be level, with a three-fourths inch raise midway, between the stanchion and the gutter; this will keep the cows dry. Give the floor the usual rough surface finish. The tar paint and tar paper will prevent any moisture from coming up, and any loss of heat from going down; and so this two-inch veneer of cement will be warmed by the body and remain warm during the whole winter.

A slight depression of four feet makes a very good manger, and is, perhaps, all things considered, the best. It makes a good water trough, is easily cleaned, and serves about the only purpose that a manger can serve.

The gutter should be sixteen inches wide, eight inches next to the cow platform, and six inches on the opposite side. This will hold the droppings and the bedding for twenty-four hours.

Two systems of ventilation are now in use. Both have certain advantages all their own. The King system, so called, is much to be preferred in the northern latitudes where strong winds and low temperatures prevail during the winter. It has come to be fairly well known in principle, but many mistakes are made in construction. The out-take flues should have an area equal to one square foot for every five cows. They should be made of wood with an air chamber filled with shavings or straw running from near the floor in the stable to a point above the ridge of the barn; or, in other words, not unlike a house chimney. These flues may be located at almost any convenient point in the stable. The usual method of proper distribution passing up the side of the barn and following the rafters is probably, all things considered, the best. An opening should be provided in the flue near the ceiling for use during the warm periods.

The in-take flues must be distributed around the room so that fresh air will enter on all sides of the room. In this way, fresh air will be evenly distributed through the room and always in motion, which will prevent undue humidity and condensation, providing, of course, that the walls are insulated. The area of

the in-take and the out-take flues should be equal; the in-take flues, however, should be much smaller and a greater number of them. They should also be provided with means for opening and closing, thereby controlling the flow of air.

The self supporting hip roof is most desirable. It is the cheapest to build and provides for the largest amount of store room.

Cement will no doubt in the near future become our chief building material, but it is at the present time too expensive to become popular for side wall and roof construction.

CONCRETE ON THE FARM.

T. W. DIX, INSTRUCTOR IN CIVIL ENGINEERING,
UNIVERSITY OF VERMONT.

My studies in concrete, limited as they are, have been along lines somewhat other than those upon which I am to speak to you this afternoon. Yet there is a close connection between the use of concrete in engineering and upon the farm. The underlying principles are much the same. It is my purpose to try to give to those unfamiliar with concrete and its uses a few of its underlying and fundamental principles, and a fair working knowledge of its construction; and to give to those who have already had some experience in concrete work, a greater confidence, not only in themselves, but also in the structures which they produce.

Owing to the constant decrease in the supply of lumber and the resulting increase in its cost, and also to the inability of lumber to fill the requirements of certain kinds of construction, engineers and architects were forced to find a new building material. This new material is concrete. It is now used for all kinds of heavy construction, retaining walls, foundations, canal locks, floors, beams, our highest skyscrapers, breakwaters, and for many other purposes. No less applicable, however, is it to lighter structures. And it is these lighter structures about the home and on the farm, such as silos, ground floors, water troughs, foundations, walls, fence posts, drain pipes, culverts, walks, etc., to which I shall confine myself.

Concrete structures where complex and intricate stresses are present need the services of competent engineers and architects who are skilled in their designs; yet, on the other hand, there are many structures about the home for which concrete is the ideal

material, both as to economy and permanency, which the most inexperienced may build without the aid of engineers, and without the slightest fear of failure of the concrete.

What is concrete? It is an artificial stone made by mixing cement, (or some similar material, which after mixing with water will harden so as to adhere to inert material) and an aggregate composed of hard, inert particles of varying size, such as a combination of sand or broken stone screenings, with gravel, broken stone, cinders, broken brick or other coarse materials.

The ingredients, then, of concrete are cement, sand or screenings, gravel or broken stone, and water. Let us consider each one in turn.

There are two kinds of cement used in making concrete structures, viz: Portland and Natural. *Portland cement* is produced by finely pulverizing the clinker resulting from the burning at a high temperature of a properly proportioned mixture of limestone and clay materials. *Natural cement* is produced by finely pulverizing the clinker resulting from the burning at a lower temperature of an argillaceous limestone. Portland cement is about twice as strong as is natural cement and costs slightly more; hence the Portland has driven the natural almost entirely off the market, and for that reason, it only, will be considered.

Portland cement may be distinguished from the natural by its color and weight. The former is a dull bluish or greenish gray, while the latter varies from a light ecru to a dark grayish brown. Portland weighs per barrel 376 pounds net or 400 pounds gross, while the natural weighs only 282 pounds net or 300 pounds gross. The manufacture of Portland cement in this country began in 1865. Since that time the varied uses of this material have constantly increased until now it stands foremost among building materials. There are upon the market many reliable brands, such as the Atlas, Edison, Giant, Alseen, Alpha, Vulcanite, Iron Clad, Lehigh, Phoenix and numerous others.

There is no brand of cement, however, which does not have the two varieties, the good and the bad. Important engineering structures require expert inspectors and testers to pass upon the quality of the cement. It is, then, essential that some rough tests be made to insure that the material is good. This is especially true, for some laboratories reject about ten percent of the cement tested. This does not mean that all rejected cement will fail, but that it is a little low in quality, and will no doubt be sold to retailers from whom the farmer and small consumer are apt to buy. Cement should be obtained far enough in advance of the time of mixing at least to make "seven day" tests. The following are the most important, and if the cement passes these tests one may be reasonably sure that it is good.

Fineness. It should have a clear, floury feeling in the hand. A gritty feeling denotes coarse grinding.

Color. It should be a dull bluish or greenish gray.

Strength. Make sufficient neat cement paste to fill three moulds, giving a specimen one inch square and twelve inches long. Mix with sufficient water so that a ball of paste one inch in diameter dropped from a height of twenty inches will not crack or materially change in form. Place a damp cloth over the filled moulds for twenty-four hours, then immerse in water for six days. Test the specimens as a beam, supports ten inches apart, and load at the center. They should not break at less than forty-five pounds.

Soundness. Make two pats, three inches in diameter, one-half inch thick at the center and tapering to a thin edge, on clean unoiled glass plates, and also a ball about one and one-fourth inches in diameter of neat cement of the same consistency as above. Place a damp cloth over the specimens for twenty-four hours, then place one pat in water at about 70 degrees F. and the other in ordinary air. Place the ball in cold water and gradually (in about half an hour) raise it to boiling, and maintain it at that temperature for three hours, after which remove the specimen. Examine the pats and ball at intervals, until at least seven days old. There should be no sign of cracking, distortion or disintegration. If possible continue these tests for periods greater than seven days; the specimens should show no signs of deterioration.

The "seven day" tests require that the cement be stored in the vicinity of the work for a period of at least a week, and other reasons may make it desirable to store it for a longer time. It should never be left in a damp place. It should be stored in a dry room and never be left on the bare ground. A platform which is at least six inches above the ground is satisfactory. If the building has a concrete floor it is advisable to cover the floor with planking upon which to place the cement. Dampness is the only thing which will impair its quality. It becomes lumpy and even forms a solid mass when kept in a damp place, and when in this condition should not be used. All lumps which do not crumble at the lightest blow should be thrown out.

The sand should be clean and coarse, or a mixture of coarse and fine grains with the coarse grains predominating. By this is meant that a large proportion of the grains should measure one-thirty-second to one-eighth inch in diameter, and should the grains run up to one-fourth inch the strength of the mortar is increased. Fine sand, if clean, makes a poor mortar or concrete, and, if its use is unavoidable, an additional proportion of cement must be used with it to coat the grains thoroughly.

Very often the sand and gravel found in a bank are used by inexperienced people just as it is found, without regard to the proportions of the two materials. This may be all right in some cases, but generally there is too much sand for the gravel or stone, so that the resulting concrete is not nearly as strong as it would be if

the proportions between the sand and gravel were right. It is better then to screen the sand from the gravel through a one-fourth inch sieve, and then mix the materials in the right proportions, using generally about half as much sand as stone. By so doing, a leaner mix can be used than where the sand and gravel are taken from the bank direct. The cost of the cement saved will more than pay for the extra labor required to screen the material. The sand should be free from clay, loam, sticks, vegetable matter and other impurities. The effect of the above impurities is liable to retard, if not prevent entirely, the hardening of the cement. At any rate vegetable matter in the sand mades a weaker concrete, and the clay or loam usually has a like effect.

Screenings from broken stone make an excellent fine aggregate, which can be substituted for sand unless the stone is very soft, shelly or contains a large percentage of mica. Gravel or broken stone forms the largest part of the mass of a good concrete, and is called the coarse aggregate. If the concrete is to be used simply for filling, or in a low wall against which nothing is to be piled, clean cinders, screened to remove the dust, may sometimes be used for the coarse aggregate. The concrete made from them, however, is not strong and is very porous. Slag or broken brick are sometimes used for the coarse aggregate.

The size of the stone is best graded from fine particles about one-fourth inch in diameter up to the coarser. The largest size pieces may be 2 1-2 inches where a foundation or a wall twelve inches thick or over is being built, while for thin walls and where reinforcement is used the largest particles had best be about three-fourths inch size. With gravel, danger is apt to lie in the grains being coated with clay or vegetable matter which prevents the cement from sticking to them, hence producing a very weak concrete. Such gravel may be made fit for use by washing. Dirty stone or gravel should not be used in any case while soft sandstones, soft freestones, soft limestones, slate and shale should be avoided.

The water used for concrete must be clean. It should not be taken from a stream or pond into which any waste from chemical mills, material from barns, as manure or other refuse, is dumped. If the water runs through an alkaline soil or contains vegetable matter, it is best to make up a block of concrete, using this water, and see whether or not the cement hardens properly.

Concrete is composed of a certain amount or proportion of cement, a larger amount of sand, and a still larger amount of stone. The fixing of the quantities of each of these materials is called proportioning. The proportions for a mix of concrete given for instance, one part of cement to two parts of sand to four parts of stone or gravel, are written 1:2:4, meaning that one barrel(or four bags) of packed Portland cement is to be mixed with two barrels of loose sand (7.6) cubic feet and four barrels (15.2 cubic feet) loose gravel or broken stone.

For ordinary work twice as much coarse aggregate is used, (that is, gravel or stone) as fine aggregate (that is, sand).

If gravel from a natural bank is used without screening, the same proportion called for of the coarse aggregate is employed; that is to say, if the specifications call for proportions 1:2:4, as given above, for unscreened gravel (provided it contains quite a large quantity of stone), one part cement to four parts unscreened gravel may be used. If, when placing concrete with the proportions specified, a wall shows many voids or pockets of stone, a little more sand and a little less stone than than called for may be used. If, on the other hand, when placing, a lot of mortar rises to the top, less sand is used and more stone in the next batch. A standard (1:2:4) mixture is as rich a mixture as will be required for ordinary use and should be used for silos, tanks, cisterns, fence posts, troughs, culverts, buildings, walls, etc., or when reinforcement of steel wire or rods is specified in any farm construction. It is waterproof and air-tight. A medium (1:2½:5) or (1:3:6) mixture may be used for walls, foundations, footings, ground floors, sidewalks, gutters, etc. In case light construction is desired (i. e. thin walls and floors) the former is employed, and the latter for heavy work or less important work in masses. Leaner mixtures than (1:3:6) may be used if the fine and coarse aggregate are carefully graded as to size. Foundations and walls may be made of a (1:13) mixture where the "13" represents the parts of sand and broken stone or gravel combined. If one is inexperienced in grading the aggregate, it is a good plan to use the richer mixtures.

Sufficient water (four to seven gallons for a one-bag or one-fourth barrel mixture) is added to produce the required consistency. This amount will vary with the proportions, being greater for the larger percentages of aggregate. It also varies with the desired consistency, there being three mixtures, the dry, the medium and the wet. The dry has about the consistency of damp earth; the wet is mushy, and will run off a shovel in handling; the medium is about half way between the dry and wet, and jellylike in appearance.

The proper mixture for a given operation will always be specified. The difference between the mixtures is that the drier the mixture the quicker the concrete hardens, but in the end, when carefully mixed and placed, the results from any of the above mixtures would be the same. In general the wetter mixtures should be used as they form denser and more nearly water-tight structures. They should always be used in thin walls and around reinforcement.

BETTER FARMING SPECIAL, RUTLAND RAILROAD, APRIL, 1910.

WAITING FOR BETTER FARMING SPECIAL

Dairy Car, Farming Special.

Forestry Exhibit on Better Farming Special Train.

I emphasize the importance of measuring all materials that go into concrete. One may make use of a measuring box for this purpose. This consists of a box with four sides but without top or bottom. When this box is placed on the floor and filled level full of broken stone, the measure of broken stone which should go into one batch of concrete is obtained. When half full it should give the measure of sand necessary for one batch. The measuring may be done with shovels, wheelbarrows, or barrels, but the materials should all be carefully measured in order to procure a uniform concrete. For the proportion of measuring boxes see Bulletin No. 20, "Mixing and Placing Concrete by Hand," published by the Association of American Portland Cement Manufacturers, Land Title Building, Philadelphia, Pa., and "Concrete Construction About the Home and on the Farm," published by the Atlas Portland Cement Co., 30 Broad St., New York. These pamphlets may be obtained by sending name and address to the above mentioned addresses.

The necessary utensils for mixing concrete are a mixing board, measuring box, shovels, hoe, the barrel for holding the water, and the pails for bringing the water to the mixing board. All water must be measured. One should decide when mixing the first batch the amount of water to go into the concrete, and then all the batches thereafter should be made with the same amount of water.

The mixing board may be made of one-inch material, and for two men should be about 9 x 10 feet. This may be nailed to five strips of 2 by 4 inch boards placed edgewise. The lumber should be dressed on one side for ease in shovelling, and tongued and grooved to prevent the cement from running between the boards and wasting.

The first operation in cement mixing consists in placing the measuring box on the board about two feet from its side and filling it about half full of sand; then raising the measuring box and spreading out the sand to a depth of three inches on the board. After the sand is spread out thinly over it, the cement is spread. The sand and cement should be first mixed together dry, using shovels, preferably square pointed, allowing the material to slide off the shovel and at the same time giving the shovel a slight sweeping motion. This mixing should be continued until the mixture of cement and sand has a uniform color.

There are two methods of measuring the gravel. The measuring box may be filled when placed on the mixing board, the box lifted and the broken stone shovelled on top of the sand and cement; or the measuring box may be placed on top of the sand and cement, which are mixed, and the gravel dumped into the box in this position.

There is no mixing done between the adding of the gravel to the sand and cement, and the adding of the water. About three-fourths of the total amount of water to be applied to the

batch should be added as soon as the gravel has been placed on top of the sand and cement.

The mixing of the concrete is carried on similarly to the mixing of the cement and the sand. The material is picked up on square pointed shovels and turned over with a sweeping motion of the shovel. After the first turning, the remainder of the water should be added to the dry places of the batch. This mixing should be continued three or four times until the mixture has a uniform color.

After the concrete has been thoroughly mixed it is ready to be placed. The screening of the sand is important and should be be done in all cases where a strong mixture is desired.

When first mixed, the concrete is simply a soft mud. It is plastic and flows like thick molasses, hence for most structures a form must be built.

In building a wall the concrete should be dumped into the forms from four to eight inches in depth. The stones will come to the surface of the forms and, after the concrete has hardened, its appearance will be honeycomb; but that may be done away with by a process called "spading." The back of an ordinary square pointed shovel is placed between the concrete and the form in such a manner as to force the stone back from the form and to let the mortar flow in and take the place of the stone. A shovel is not a very good instrument to use when building a thin wall. A four inch board, sharpened at one end to a chisel point, may be used, by pushing it between the concrete and the form so that the stones are pushed back away from the form and the mortar flows in and takes their place. After this has been done the concrete in the form should be carefully tamped until the water flushes to the top of the concrete. The form, ordinarily, should be well oiled, using machine oil, linseed oil or kerosene oil. Since concrete is in a plastic form and weighs 150 pounds per cubic foot, immense pressures are placed upon the forms which should be thoroughly braced.

In placing the concrete it is sometimes well to put in stones larger than those used on the mixing board. This does not lessen the strength of the concrete if the stones are placed in the proper manner. Stones should be clean and thoroughly wet with water before being placed in the concrete, and none of the corners, edges or surfaces should be allowed to cóme within two inches of the forms.

Earth, where it is compact and firm, may well be used as a form. In placing concrete against dry walls there is one particular precaution, and that is to soak the wall with water before the concrete is placed. If the wall is dry it will draw the moisture from the concrete and cause it to crack and weaken.

I said a moment ago that all concrete forms should be well oiled before the concrete is placed. There is one case where this should not be done, and that is when an artificial surface is to be placed on the wall. The forms should then be wet with water

instead of oiled. A pleasing surface may be secured by removing the forms as early as possible at the expiration of 24 or 48 hours, rubbing off the skin of cement wth small pieces of board, then painting the surface with a cement paste made with water and clear cement so as to have the consistency of ordinary cream. Another method of surfacing is the one known as the pebble-dash finish. Here, instead of using broken stone in the concrete, rounded gravel should be used and, as soon as the forms are taken down, the cement should be cleaned away from the stones back to a depth of a half inch. This is done by using a hammer and chisel or other sharp pointed tool.

In constructing forms for concrete fence posts a foundation is built similar to a mixing board, and two boards are placed on edge parallel to each other and at a distance apart equal to the required height of the post, bracing them thoroughly. The height of these pieces placed on edge should be equal to one dimension of the post, say six inches. Lengthwise between these boards those are nailed on edge which are to make the side forms of the post. The distance between these boards should be five or six inches. The concrete is placed in these forms, to a depth of one inch, then two bars are put in, each one inch from the side, each in length equal to that of the post. More concrete is then used being filled to within an inch of the top of the form, two more bars, also one inch from either side, are then put in and the form is filled. These rods should be one-fourth to three-eighths of an inch in diameter. Square rods, round ones, or ordinary fencing wire may be used. One other consideration in this matter of fence posts is the fastening of the fencing to the posts. A piece of copper wire 16 inches in length is doubled and twisted for a distance of five inches, then placed in the concrete as it is being moulded, allowing the untwisted ends to project. Another method is to place vertically in the moulds some iron rods, which should be thoroughly oiled so that they may be easily removed from the concrete after it is moulded.

Concrete may be used for watering troughs. For a trough of circular shape the form may be made by placing a tire from a wagon wheel on the ground and marking a circle, excavating inside this circle to a depth of six or eight inches, then raising the tire to a height of two feet and placing upright boards of the desired length, thus using the tire and the earth at the bottom as hoops. Then the concrete may be placed in the bottom to a depth of six or eight inches. For the center form use an ordinary barrel. It will be well also to put in a few wires (going entirely around the shape) to take some of the stresses.

It is necessary to waterproof concrete structures where water comes against the concrete surfaces. The Sylvester process is probably to be preferred. This consists of covering the concrete surface with two solutions, one of a soap and one of an alum. The former is made by dissolving three-fourths of a pound of castile

soap in a gallon of water, and the latter by dissolving one-half pound of alum in four gallons of water. The soap solution should be applied with a brush when boiling, and at the expiration of twenty-four hours the alum solution at 60 to 70 degrees F. should be applied in a similar manner. Two or three coats of soap solution and as many coats of the alum solution are applied. The solutions enter the pores of the concrete and crystallize, making a solid substance. Waterproofing may also be done with the same materials but in a little different way, by taking a five percent mixture of alum and a seven percent mixture of soap, mixing those two solutions in equal parts and using in mixing the concrete.

A concrete silo should be reinforced by horizontal and vertical steel bars, the horizontal ones being one-half or three-fourths inches in diameter, and the vertical ones a little lighter. There are three different kinds of silos, the single wall, the double wall and the concrete block silo. The single wall is fairly satisfactory, but the double wall more satisfactory, also more expensive.

Concrete is one of the best fire-resisting substances that we have. Insurance companies consider concrete a good risk, since it resists any ordinary fire.

DISCUSSION.

How would it do to put a thin coating of cement on a roof?

That is an unusual form of construction. There are many concrete roofs and they are proving very satisfactory. In order to carry the weight of the cement you would have to have a strong roof.

Is not some reinforced concrete thus used?

Roofs are made of reinforced concrete, but for good construction it is not desirable to place concrete above a wood roof, the main reason being that if the roof is old it is not apt to be strong enough to carry the load of the cement.

Will the frost penetrate a cement wall?

No, not ordinary concrete.

What is the cost of concrete as compared to stone?

That depends upon conditions. Sometimes a concrete structure may be built for less money than a stone structure. If you have stone that splits easily near at hand, the stone would be the cheaper; but if you have to go some distance for it and it does not lay up nicely, then the concrete wall would be the cheaper.

Is not one good feature of concrete the fact that it eliminates the necessity of skilled labor?

Yes, a great many concrete structures do not need skilled labor in construction.

In a case where gravel was scarce could you use coarse sand?

It would be very expensive. The gravel is put into the mixture as a matter of economy.

What proportion, of good, clean, coarse sand is used in building good walls?

If there were no particles greater than one-fourth inch in diameter the proportion would be one part cement to two and one-half parts of sand. You could place large stones in mortar of that sort.

Would it not be expensive on account of taking more cement?

Yes, it would take more cement and therefore be expensive.

In excavating for the bottom of a manure cellar, if you struck hardpan would it be necessary to make a sub-foundation of stone?

No. For such a bottom a mixture of 1:2½:5 would be a good mixture, placed to a depth of about four to six inches, directly onto the hardpan.

What does concrete cost a square yard?

A mixture of 1:2½:5 will cost from $6 to $7 per cubic yard. A cubic yard of concrete would cover a floor four inches in depth, about 80 square feet, 80 square feet would cost you in the vicinity of $6 or $7.

Where you use stone well packed would you need to put it in four inches thick?

Yes, but I would not advise the use of big stone.

You would not put in cement with the gravel?

No, put in gravel and stone and tamp it well.

Would you follow the same plan in making a foundation for a cow stable?

Yes, if it is to be built on the ground. It might be well to make the thickness from five to six inches, but use the same mixture of 1:2 ½:5.

Which would you consider the better filling, stone and gravel or fine cobble stones?

I should say the stone and gravel. If cobbles are used, use with them some sand to keep them from slipping upon each other.

What depth would you dig your trench for a foundation wall for a barn 100 by 48 feet?

The foundation should go below the frost line.

Suppose you struck solid rock?

Then clean the earth off and put the cement directly on top of the rock.

Is it necessary to put a trench between concrete and the foundation?

That depends on the soil. If it is clay then a trench should

be put in to take care of what water may collect. In a loamy soil it would not be necessary to put in a trench.

WHAT A WOMAN CAN AND CANNOT DO WITH POULTRY.

FRANCES E. WHEELER, CHAZY, N. Y.

If a woman wishes to enter the poultry business as a self-supporting industry she must begin before it is too late, while she is in a pliant condition and has the power of adaptability. There is a class of city women who seek rural life; those who feel the nervous strain and realize that they have got to get out of it right now or not at all. These women are the ones who make of poultry business a success. They have the business habits, the accuracy in detail and all those things that a business training gives them, and their common sense has been well developed along those lines. The qualifications of all women who are obliged to be self-supporting in rural life are thoroughness in detail, common sense, hope, imagination and adaptability. These go for success, and any one who is going to embark in the poultry business must stop and think whether they have these qualifications, because there is a combination of circumstances in a woman's poultry life which makes these things an absolute necessity to her. It was not choice, but necessity, that took me from my city business to the country and to the poultry business.

At my home there were some bees which had been sold, but were still left on the place. In the spring I supposed their owner would take them away, but he did not, and the bees commenced to swarm out of the cellar when the summer commenced. I took care of them during the summer and became much interested in them. We harvested a fair crop of honey, and in the fall I made arrangements with the owner to give him the money from part of the crop each year until the bees were paid for. That winter I sailed into bee literature. My greatest trouble was in securing help when it came time to harvest the crop, and I realized that I must have enough business to pay me for keeping steady labor, so embarked in the broiler business.

I had a few Silver Gray Dorkings and a few ducks at that time, and while chickens were a drug in the market, at the hotel they had great difficulty in getting first-class ducks, so I gave up broilers and specialized in ducks. The piece of land that I devoted to my ducks was less than one-fourth acre, buildings and all, and on that I raised two thousand ducks in one season. I started with

five ducks and a drake. Right here I want to say that any one going into the poultry business should begin in a small way and feel their way carefully and slowly. Let the turkeys, or the ducks, or chickens, build your plant for you as mine did for me. My ducks and other things not only turned our home from an old rookery into a very charming little home, but brought the land up to a fine state of richness. I know of nothing as valuable for fertilizer as the excrete of ducks or as well adapted to bring up a run-down place, as a flock of ducks. They need bedding and they must have things dry. My hired man used to say that we were throwing out just the straw, for he did not realize the richness of the guano scattered all through that straw; and when I had my land so that it almost stood alone, the people around me did not care to buy my surplus guano because they thought it was all straw.

Ducks were the branch of poultry that I found most profitable for me beause I had a market, they enriched my land, they required very small space and necessitated a very small initial outlay. I would not advise any one to go into the duck business unless he has a first-class market. My two thousand ducks consumed one thousand pounds of feed in four days, and you have got to be pretty sure of your market to get that money back. Another difficulty we have is in the plucking. It requires a special training and it is hard to acquire the "know how."

While ducks are little, an 18-inch wire fence will keep them where you want them, and a shed is sufficient shelter. They need, if incubated, from ten days to two weeks artificial heat. When older, a three-foot fence will keep them in and almost any kind of a building will do for them that is dry and not draughty.

Now regarding poultry keeping for women,—I have watched these young girls and boys in our rural schools and have been spending this last week at the Agricultural College at Ithaca, N. Y. I have seen the students who were taking the agricultural course as a preference. I have had some experience with these young people, and I would like you parents to realize that many of these children have been for very many years only theoretically interested in farming. Their life and interest has been in their books. You tell your son that, when you go, the farm will be his and that you want him to perfect himself in dairying. That is a great mistake; let him make his own choice. It is the instinct of our nature to impress our own individuality on our work; so give your children something on the farm that is their own, and of their own selection. Your daughter should have some way of being independent and earning her own pennies without going away from home.

For a woman in the poultry business, I would suggest that unless she wishes to invest in expensive land, buildings and appliances, she can make a good income, in connection with her poultry, by raising small fruits and bees. It relieves the mono-

tony, and while poultry keeps you at home the year round, if you have bees you can put them into the cellar during the winter, and with small fruits only part of your time is taken up, and that is about six weeks in the summer. As regards both small fruits and poultry, the main point really is the market, and a woman never wants to have anything to do with the middleman. She needs to have her own customers and get the first price in order to make a success of it, and therefore must study the market.

In poultry one has many branches from which to select: there is egg production, the broiler, the roaster, and the preference in breeds. Which works the best for the line you wish to follow? Then there are the fancy lines, the development of fine breeding species or show birds, also specialties such as squabs, etc. Professor Hodges gave us at Storrs, Connecticut, last summer, a delightful lecture on the preservation of wild game and demonstrated their easy domestication by bringing in a few quail that he had raised himself. There is a good market for guineas also. Since our wild game is disappearing so rapidly, the raising of birds to take their place becomes very profitable. A little guinea, the size of my hand, sells for one dollar at the Saratoga club houses.

As regards small fruits, my preference is currants, for the reason that I am so far away from a fancy or general market that I must have something which is a good packer. I fought shy of strawberries, but finally had a present of some plants that were so satisfactory that I am in the strawberry business in a small way now; but currants are my main crop. Where there is a nearby market I think there is a profit in many of the small fruits.

DISCUSSION.

At what age do you market your ducks and what do they weigh?

I try to get them as near ten weeks as I can, and they average about five pounds. Some weigh a little less and some run up to seven pounds, so we get a fair average in our markets. We send out from thirty to sixty birds at a time. I have had birds nine weeks old that weighed seven pounds.

What do you feed the ducks?

I keep my ducks in the incubator nearly three days from the time the first one breaks the shell. They are left in the brooder for a couple of hours with fine sand and water. The first feed is bread crumbs soaked in milk and squeezed dry, then spread on a clean shingle. I have a few crumbs for the weaker ones during

the first eight meals or two days. The third day, hard-boiled, fresh, unfertile eggs are chopped fine and mixed with the bread, about one-fourth egg to three-fourths bread. This is continued during the first week, with fine cut lettuce, clover or other tender grown stuff. The chill is taken off the water and it is given after the feed. Toward the close of the first week, I work in a little wheat bran instead of the bread. The second and third weeks I substitute, gradually, for the bread, three-eighths wheat bran, two-eighths corn meal, two-eighths rolled or cracked oats, one-eighth beef meal. I add in bulk to this mixture, one-fourth green stuff. During the third, fourth fifth, sixth, and seventh weeks, I use equal parts wheat bran, corn meal, and oats, one-eighth beef-scraps. (At this stage breeders are separated from market birds.) From seven to nine or ten weeks I give three-sixths corn meal, one sixth wheat bran, one-sixth oats, one-sixth beef scraps. I feed three times daily during these last two to three weeks, and during the seventh week the change in food must be very gradual and great care exercised in feeding. I always mix the same amount of grit as beef scraps and give green stuff sparingly at the last.

When I get the ducks to the fattening stage the feed is pretty nearly all corn meal, and I have to watch them as a hawk does a chicken; because if they get just a little bit too much they are done for. I advise the feeding of sour milk to all poultry, very generously, also grits, for these keep their systems right. I do not give it to the ducks when they are little, because it is liable to stick up their bills.

What strain of ducks do you propagate?

The Pekins. There is a great demand for large (10 to 12 pound) birds; but I always discourage breeding from these because they have usually been forced up to the top notch, and their digestive organs weakened. My method has been to feed them for bone, muscle and strength and to keep them in their pens until I am ready to fatten them for market. Then I separate those that I am going to reserve for breeders and give them free range and access to water, and while the birds are not over large they have a vigor which enables you to force their progeny to almost any size.

Did you ever have experience with the Philo brooder?

No. I managed all ways at first, but at last settled down to what we call the Stoneburn brooder house. You can stand on a level, draw out and fill your lamps and overlook the whole house. I have found it the most satisfactory and I use just enough heat to keep the birds comfortable.

Did you supply a general market?

I had to once for I got overstocked. After we pick the ducks we put them into cold water and keep them there three or four hours; then they are wiped dry, packed and shipped to the hotel.

Did you market them drawn or undrawn?

Undrawn. At Cornell Miss Pennington gave us a most

interesting address on the proper way of killing and marketing birds. She says that where the flesh of birds is broken the bacteria gain entrance quickly and they spoil four days earlier than birds that are dressed without a break. Then a bird that is improperly bled will spoil a great deal quicker. The method of killing she advised was the hanging of the birds on the rack above, by the feet and head, fastened down by a hook. Right where the mouth of the bird would come there is a hole in the table with a pail to catch the blood. They claim that where a bird is not held vertically the blood will settle in the veins. They stick the bird with two cuts, one through the brain and another at the base of it. This is the crosscut. If you give it the cut from the back of the brain straight through toward the front you are liable to miss the point you are after; the crosscut is the bleeding cut which she recommended. She also recommended never touching water to the bird where it could be avoided, but if we do have to use water for cooling our birds to dry them very carefully. I pack each bird in a little nest of straw, and they are much nicer if packed with the breast up.

TURKEYS.

FRANCES E. WHEELER, CHAZY, NEW YORK.

In any branch of poultry you can expand as much as you like if you begin small enough and go slow. It is the same with the small fruits. When I took our farm there were a dozen currant bushes on it, and when I trimmed these bushes it seemed to me a waste of material to throw away those sprigs. So I cut off the best and healthiest of the shoots about eight inches long, tied them up in bundles of fifty, dug a hole in the ground and stuck them in with the cut ends up, covered them with a few inches of earth, and on top of that put some manure. This was in the fall. In the spring I set these currants out in a nursery. The shoots were placed about a foot apart and in rows, say two feet apart, and I cultivated them just as you would cultivate your vegetables. The next spring we transplanted them in rows about a yard and a half apart, and every year when I trim I pick out a few of the best slips and plants as described. Our currant crop is now 1,500 pounds a season. Some of our bushes yield up to twenty pounds per bush. We pick them over three times and sometimes the fourth time, but three times usually gathers the crop.

As to strawberries, I had a bed 26 x 30. The plants were sent me by a friend, and were budded and some were in blossom. We put them in a carefully prepared, rich piece of ground, and that year my mother had all the strawberries she wanted for six weeks. Last year that bed yielded us all the strawberries that we could eat (a family of five), I sold $10 worth of berries and $10 worth of plants, and set out a new bed of 1,400 plants; about 1,000 plants are left on the old bed. So you see with a very small beginning, if you are careful and have your land right and your plants in a healthy condition, you can expand as much as you like.

Regarding poultry buildings, I would advise any woman to start in a small way and to feel her way very carefully. I suggest the advantages of a combination of this kind—poultry and fruits—because there is a variety of work which relieves the monotony, and in the long run the crops will average as much as if you made a specialty of any one line.

Regarding the selection of small fruits, as well as poultry, a woman must look over her environment and see wherein she can best expand and work to the best advantage. She must have her market. If she has a nearby market, raspberries and blackberries and fruits that are easily spoiled will be satisfactory; whereas, if she has to ship a long distance, of course she must select a fruit that will carry well. The strawberry that I have, which has brought such good results, is a very good packer. I am arranging to send a part of my crop to Saratoga this summer and I think that the berries will carry perfectly there from the head of Lake Champlain. There is quite a demand also for the large english gooseberry. It is a very fine thing, easily raised and a good packer.

With reference to the branches of poultry for a person to work at, it is like all of our work in life—until we have tried it we cannot tell, on a farm, what is going to be the best line. I always say, "Three times and out." Anything that appeals to me as profitable and a good combination, I try it the first year; if it appeals to me as practicable I will give it another trial; and the third year if it does not work satisfactorily it is dropped, for the time being at least.

As to the turkey, of course you all know that we can claim it as indigenous to America. Our other fowls originally came to this country with our early pioneers, but the turkey is the one domestic fowl that we can lay undisputed claim to, and for that reason we ought to develop it and never give it up. The first turkey that we know of that went abroad, crossed the water about 1524, and the first that we have authentic reason to believe was used on the table was at the wedding feast of Charles IX to Elizabeth of Austria in 1574. Then the turkey commenced to be bred in the forests of St. Germain, and soon turkeys became a very popular bird on the continent, in Spain, France, and Holland, and in England. It is thought that the variety called

White Holland obtained its name in this country, from some special importation from Holland. It is considered by the French and Hollanders as the finest of all the varieties of turkeys. Unmistakably, as regards a table bird, the White Holland is superior in juiciness, fine grain and flavor to the other varieties. The flesh is a rich yellow, and the breast is more prominent in the well bred White Holland than in the other varieties of turkey.

There are various reasons for my preference of the White Holland. I had always looked longingly on turkeys because they are big, and I thought that one turkey would mean more than a lot of chickens, so they rather appealed to me. Finally, when I had been in business some time, a party came to see me who was quite enthusiastic and offered me as a present a White Holland hen turkey, and I thought I could get quite a good mate for it from a judge in Canada who was a specialist in the line. I wanted the White Hollands because I knew that no one else in that section had them and that I could pick mine out of any one's barnyard. Another reason was because they stand in the middle between the Bronze and smaller grades of turkeys. The Bronze are best suited to hotel use. The larger of the White Holland are good for hotels and things of that kind, and they grade down so that the younger birds are a very nice size for a family; and, another thing, the White Hollands are not such roaming birds as are the other varieties. They are more domestic in their habits, more easily thoroughly domesticated. My birds are very seldom out of my sight and they always come home at night.

I have tried many ways of hatching and raising these turkeys. So far as the hatching is concerned I think that the incubators hatched as well as the turkeys' mothers, but the after-results were not so satisfactory. I have noticed in handling chickens that they learn their mother's voice before they are out of the egg. It is especially so with turkeys, and it was rather embarrassing for me to be the mother of a very large family which recognized no other voice but mine and which would trail down the street after me. Another peculiarity of the birds that bothered me considerably was that they would take no food except out of my hand. I got rather sick of this, but I found that with incubator-hatched turkeys, if you let into their yard a few little chicks and scatter the food, when the turkeys see the chickens scratching for it they will scratch too, learning to eat from the little chicks.

Regarding all artificially raised poultry, especial care should be taken about brooder overheating. There is no question but what turkeys are, under artificial conditions, more delicate than are chickens. I do not think that they are any more delicate than are ducks, and they are no harder to raise, but they require very different management. I have a correspondent out West who runs a large farm for a gentleman and raises the Bronze turkeys entirely with incubators and brooders, and he has no difficulty whatever. The little birds are kept in an enclosure until they

are accustomed to come home. You can keep a turkey in the brooder house yard for a short time, but the natural habit of the bird is to wander, and the little turkey wanders and talks, or in other words, calls to its mother, and usually wanders and calls until night overtakes it. It never will come back if allowed to go free, and if it does not hear the mother voice. When I was picking currants my little turkeys would be in the berry patch, and as long as I answered back they would stay by quite close; but when I stopped they would wander, and before I understood the combination I lost quite a few unnecessarily. If you have a fairly large place enclosed for incubator-hatched and brooder birds, then every feeding time you want to call them to the central spot, and if they do not come you must hunt them up. After a little you will find, when they have formed the habit of coming to that spot, that you can give them more range, but for a while you have to look after them.

As to hatching turkey eggs under hens, I speak with hesitancy, because of the connection of this blackhead disease that has troubled us so much and injured turkey raising to such an extent. I heard a very interesting lecture last summer, at the Connecticut Poultry Association field week, on this germ that is destroying the turkeys, and I have read a good deal on the subject. I do not think any one has yet discovered a satisfactory remedy. The Rhode Island experiment station has made a very close study on this subject and claims that the contagion from the hen is so acute that it is even conducted to the turkey eggs through the hen sitting on them. Hence, I hesitate about recommending hens for hatching and as mothers. Still, I think that if a person is careful to have a good healthy hen, and eggs from good healthy stock, he need not greatly fear. It is the same with turkeys as with all other fowls,—the birds should be hatched early. Then they get their growth and vigor during the most favorable part of the season. One of the reasons why turkeys have proved a failure has been because people would sell the early eggs and save for breeding the late hatched ones. These are weaker and do not stand the racket as well as do birds hatched in April or May. Our birds begin to lay their eggs about the first of April, and I think it is all right to set a hen or two with these eggs. The birds need the mother's care during the cold storms; but the hen is in a hurry to hatch out another lot of chicks and will generally leave the little turkeys too soon. A turkey hen that hatched in April will take care of from eighteen to twenty eggs and perhaps more, and sometimes bring out every poult, and she will not let them go till they are ready. Do what you can with your hens and make a start; but the birds that you take the most comfort in are those turkeys raise themselves. All that we need is the natural method of turkey raising, (providing the mother bird is healthy and the eggs are from healthy stock), and a little care during the first two or three weeks of the bird's life.

My method with breeding stock is to have two yards; a home yard and a yard about a mile from home, with a neighboring farmer. I furnished the breeding stock, advertised and sold the eggs and the birds. I gave him half of what we got from this line of the business. He fed and cared for the birds. In the fall we divided the profits, then of the birds that were left I had half, and if I wanted to buy the other half I had the privilege of doing so at about two cents over the market-selling prices. The arrangement has worked to our mutual satisfaction. My reason for having two yards was that I could furnish stock that was non-related. Both of my toms were non-related. In furnishing my customers I could pick out the young tom from one flock and the turkeys from another, and in that way we had a healthy breeding stock for our customers.

Keeping birds sheltered from the rain, when they are large, I think is unnecessary.

There is this difference between the loss in turkeys and that in ducks or chicks. You lose quite heavily in chickens or ducks for you have put a great deal of money into your plant and feed. Not so, however, with turkeys. What you lose is the profit, not the money that you have put into them, in the care and feed and housing. If farmers realized that, they would hang on to their turkeys.

Another thing, turkeys are such a splendid thing on the farm to clear the ground of insects. If farmers would keep wire netting around their gardens and allow their little chicks and turkeys to roam free, they have no conception of what it would mean to their land. Our turkeys spend much of their time in the orchard. The first lot of strawberries I put in were cut off by cutworms as clean as if scissors had snipped them off, a very common occurrence. Last year I had my land cultivated and made ready for more strawberres and then turned the chickens in on it. They lived on that patch for three or four days and we found no grubs at the end of that time. It is the same story with our currants. A great many of our neighbors' bushes would be stripped by the worms. I spray my bushes but once in the very first of the season with a weak solution of paris green, then let the chickens run, and there is no more trouble with worms and the leaves are beautiful at the very last. It is the chickens that destroy worms. It is the same with our apple orchard. Every farmer should have a fenced-in yard for chickens; for certain times in the year it is necessary to keep them shut up, but the rest of the time let them run.

We rarely take into consideration the value of turkey plumage, from a market standpoint. The fluff of a White Holland turkey is worth $12 a pound, and all other feathers have a good market value. I sold ours last year and estimated that it brought the value of the feathers on a bird to about forty cents, which is certainly worth while. The difficulty in the business is that it

takes a good many turkeys to make a pound of fluff, and the wholesale dealers do not wish to be troubled with small shipments. Hence it is advisable for a neighborhood to combine in raising turkeys and saving the plumage. If you have a grange and the members are turkey raisers you could put the handling of the plumage into the hands of one man. It is the same with a great many varieties of our poultry birds. I have had inquiries for feathers of the domestic fowl. Our domestic birds are becoming really valuable for their plumage.

A word further about this blackhead disease. I want to understand the disease so that I can prevent it; for a bird that has once become sick is never fit for breeding purposes. I had a turkey once that had her claws caught in the egg shell so that one of her feet was a little turned in. When she grew up she was one of the prettiest birds in the flock and weighed about twenty pounds. We kept her to see if the result of an accident like that would be reproduced in her progeny, and in every one of her hatches a bird or two had that defect. You must never breed the progeny of a tom back with him, or anything of that kind. If you have a flock you can keep that flock going from four to five years just as it is, but if you break up that flock, change either the tom or the hens. In selecting a tom be very careful that you select from perfectly reliable parties, and from healthy, non-related stock, because it is a very bad thing to get anything like the germs of this disease (blackhead) into a flock, since it is very contagious. Yet every bird that dies of disease has not a blackhead, nor are all birds that die with a blackhead attacked by this malady. It is often a case of congestion, and blackhead. Indeed the term blackhead is, in that connection, somewhat of a misnomer. It is claimed that it originates a parasite that lives in all hens, although it does not seem to inconvenience them. Turkeys are apt to take this disease if fed with the hens. The disease is fatal to turkeys. The liberal use of sour milk is the best preventive, as well as remedy, that you can use. The germ is taken in with any hard food and propagates wonderfully fast, and in the slow digestion of this hard food it gets in its work; whereas if you give the birds sour milk when they feed, they will drink this milk before they leave and wander off, and this milk not only helps to kill the germ, but whatever is there of a poisonous nature is carried off before it gets in its fatal work. For that reason, the very best thing for little turkeys is bread and sour milk for their first feeds, and after a week, perhaps, I give them wheat soaked in the sour milk, and gradually work off on to the hard grains. The crop of a little turkey is exceptionally small, and one great trouble that we have had with our birds is due to overfeeding. A little turkey does not get very much grain in its natural condition, so that it really does not require the hard and rich food that we are apt to give. Small seeds, such as bird seeds, of all kinds are excellent.

DISCUSSION.

Do you think any kind or amount of food will make a hen lay that is not of a laying strain?

Yes, you can improve her by judicious feeding. The egg production has become such a scientific proposition that it really requires a lot of brain work to get down to the fine points of care and feed.

Did you ever have any experience in feeding dry bran?

Yes, I tried this dry mash for my birds and they did not seem to take to it. So I gave them a crumbly mush which they ate much better. On the dry bran feed they dropped in their egg production; but when it freezes the dry mash is surely best.

Referring to your turkeys, do you find that those which roam some distance away are as troubled with blackhead as are those that are confined?

I do not think I have had any genuine cases of blackhead (still I may have and not known it). But birds which roam in a natural way are always far healthier for it. The birds from which we breed and want to get good breeders should have their liberty and not be confined. It is not a natural condition for them.

Are you able to control your guineas in their laying and nesting?

I have half a dozen guineas which I have had two years and they have laid a lot of eggs. I have hatched quite a lot of them in different ways, but have never succeeded in raising a single one. In hatching them with turkeys the turkeys are so heavy that they kill the little birds; when hatched with hens they don't seem to recognize their mother's voice, and go off independently and are lost; when hatched with guineas the guineas trail them all over creation and they die. I have never hatched them with incubators or raised them in brooders. Now I propose to get some Cochin bantams that are small and quiet birds, and put each one in a house by itself, and let them hatch out my guineas, and I am going to fix that house and yard so that they cannot get out of it when I do not want them to. I think after a while they will recognize her voice and become tractable. I shall feed my little guineas a very simple food, a sort of custard made of egg that is partially cooked; but I believe the trouble is going to be in giving those birds their freedom and keeping my fingers on them at the same time. But I think, if, during the first month of their life, they are kept with their mother and then allowed to run in a larger place,

that I can let them go. The great enemy of the guinea is the domestic cat. She looks upon it as she would upon a bird, and is as persistent as if after a pet canary. The same difficulty exists with the domesticating of quails and such fowls.

Do you visit the nests of the guineas?

If we do it breaks up the nest. We have to get the eggs out with a long-handled spoon.

DAIRY FARM MANAGEMENT.

L. G. DODGE, OF THE OFFICE OF FARM MANAGEMENT, UNITED STATES DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

In the course of my following up of the most successful, paying farms as I go over New England, I have found numerous illustrations of how good dairy farmers have solved the problems that they had to meet. A good many of the dairy farmers in New England are not making the profit they ought to and we want to know why. There are two reasons. They are founded on the principle that although a great many dairymen have good cows and know how to take care of them, there are comparatively few who are tilling their land at the same time, and getting the most out of it. It does not matter so much whether you can make that cow produce 250 or 300 pounds of butter, but how much butter are you going to make from an acre of your tillable land. If we do not handle our land about right,the amount of butter that we make off an acre is going to be pretty small. The chief reasons why we are not making more are the *mismanagement of grass land* and the *mismanagement and misuse of barnyard manures*. On the successful dairy farms that I shall speak of, they have solved these problems in one way or another.

A great deal of the grass land is not adapted to rotation, but very frequently it might produce two and one-half tons of hay per acre. We are not raising enough grain, but are buying enormous quantities. The remedy that these farmers are applying is to put all the land which will grow corn successfully into a short rotation. That means that it is to be about one year in corn, one in small grains, and one or two in clover hay. To do that we must have one-fourth to one-third of our land in the corn crop, an equal amount in some small grain, say peas, oats and barley, with which to seed, and then only the remainder of our land in hay.

The figures in the following table are taken from twelve different farms in New England, five of which are in Vermont. In figuring up the land to be used for cows, I am considering that it takes two head of young stock to be equivalent to one cow in the amount of feed required.

Farm No.		System	Tilled Land Acres	Pasture Acres	No. of Cows	Cattle. Young Stock	Tillable land per animal Acres
1	Silage	Grain purchased	40	40	25	15	1.09
2	"	" "	200	225	140	100	1.05
3	"	" "	18	150	11	3	.95
4	"	" "	75	75	55	25	1.10
5	"	" "	175	100	110	25	1.40
6	"	" "	28	36	25	15	.83
7	"	" "	74	40	70	25	.89
8	"	" "	80	..	45	..	1.77
9	"	" raised	65	60	35	12	1.56
10	No Silage	" purchased	16	40	11	3	1.23
11	" "	" "	18	..	20	..	.90
12	Silage	" raised	60	90	25	15	1.66

The following table shows the same farms, giving the tillage land occupied by these three different classes of crops. In one case there is no pasture and the land was so unevenly divided in character that the man had to keep his corn crop on the same land every year. It brings up the acreage necessary for him to keep an animal.

		Approximate number of acres in			Percent of tillable land		
Farm No.	Tilled land Acres	Corn	Other Cereals	Grass and Clover	In corn Percent	In other Cereals Percent	In grass and Clover hay Percent
1	40	12	10	14	30	25	35
2	200	50	100	150	25	50	25
3	18	4.5	4.5	9	25	25	50
4	75	22	22	31	30	30	40
5	175	58	17	100	32	10	58
6	28	6	2	20	21.5	7.5	71
7	74	25	20	29	34	25	31
8	80	30	..	50	37.5	..	62.5
9	65	16	16	32	25	25	50
10	16	..	4	11	..	25	70
11	18	2	..	16	11	..	89
12	60	14	15	30	23.3	25	50

On farms No. 1, 10 and 12 a small area out of the tilled land is used for potatoes.

On farm No. 2 the 150 acres grass and clover seed includes 50 acres of permanent pasture.

On all except farms No. 9 and 12 other cereal crops than corn are used for hay or silage. On these two they are cut for grain.

On farm No. 11 all corn is raised for grain, and figures there apply to winter feeding only.

In looking at the two tables it is easily seen that with one exception when the percent of tillable land devoted to grass and clover hay is more than 50, the number of acres of tillable land required for each animal becomes especially high. On farm No. 6 there was an exception to this for the clover crop was seeded directly in the corn and so heavy yields have been obtained as to make up for the lack of other crops. In the two cases where the grain was raised on the farm, namely No. 9 and No. 12, although only 50 percent of the tillage was devoted to the ordinary hay crop, the number of acres of tillable land per animal is relatively large as it must be to produce the concentrates in addition to roughage.

There are a good many acres on some farms that can not be put into short rotation, for they are adapted to hay only. I know of one very successful farmer who has 200 acres of hay land, 100 acres meadow and 100 of pasture. He simply top dresses those meadows every year and only plows up ten or twelve acres a year, which he plants to corn. He has been successful in keeping his pastures up by top dressing them whenever he could. The top dressing of grass land he has done with about eight or ten loads of barnyard manure every season and has sown clover seed at the rate of two or three pounds per acre. This addition of clover seed helps to make up for not getting that land plowed.

As to the care of our permanent pastures I will quote from the report of Mr. Cotton of the Department of Agriculture, who has been investigating range feeding conditions all over the West for several years. In his report he says:

"One of the most harmful practises in New York and the New England States is that of turning the cattle on pastures too early in the season. In a great many instances, if the cattle were kept off for an additional week or ten days, the pasture would produce far more feed during the entire season and would actually carry more stock. The grass should be given a sufficient start to allow enough green leaf surface for the manufacture of the necessary substances utilized in its growth. If the grass is not given this chance its growth will of necessity be very slow and limited.

"The turning of stock on a pasture while the ground is wet and inclined to be 'punchy' is also a very bad practise, especially if it is a clay soil. The continuous tramping results in packing the soil so hard that it is difficult for the plant roots to penetrate between the soil particles and get the necessary food."

Mr. Cotton then goes on to say that the first step to improve worn-out pastures is to prevent overgrazing. How many of our pastures get enough growth before the cows go on in the spring so that the grass has any chance to go on growing? With reference to over-grazing and leaving the plants to make seed and thus keep up the stand, Mr. Cotton says:

"A very essential point in the improvement of worn-out pastures is to prevent over-grazing. If a pasture is to be improved it is absolutely necessary that the grass be given a chance to make a good, healthy growth and that some of the plants be allowed to produce seed. This can be done by reducing the amount of stock or by giving the cattle additional forage to supplement the pasture."

With reference to additional fertilization, Mr. Cotton says:

"Investigations carried on during the summer of 1909 show that one of the most essential points in pasture improvement is fertilization. A close inspection of Eastern pastures shows them to be lacking in humus. The best remedy for this trouble is barnyard manure. An excellent way of building up a pasture is to haul whatever supplementary feed is given the cattle on to that field, placing the feed on the highest points."

Now it remains to be seen how cheaply an acre of pasture land can be improved.

As far as the use of barnyard manure is concerned, by using a small amount on any of our land, there is one thing we must know, and that is that the man applying a small amount, and that frequently, is the man who is getting the best yields. That is shown by the experience of practical farmers and by other experiments. At Pennsylvania State College, in a four-year rotation of corn, wheat, oats and hay, they applied barnyard manure twice during the four years and found that with applications of twelve tons per acre they increased the yield of those four crops to such an extent as to get back $2.16 for every ton of manure applied. When applied at the rate of sixteen tons per acre they got $1.60 in increased yield for each ton, and when at twenty tons per acre, they got $1.40 per ton in increased yield.

The next thing that light applications of manure accomplish is that you get more acres manured so that you grow more corn every year, and this in turn makes possible the short rotation of which I spoke. You can not put 30 percent of your tillage land in corn unless you have manure enough to spread over the area. By distributing manure over that acreage and putting 10 loads, instead of 30 or 40, on an acre, it is possible to distribute the manure over a larger acreage of land for corn and still perhaps have enough to top dress some of your hay land. Short rotation does another thing. In combining a short rotation with this method, if, in distri-

buting manure over a greater acreage, the manure is supplemented by a valuable clover sod on which to plant the corn crops. A few of the most important results that we get from short rotation are: roughage for more cows from a given area; more protein raised at home, and hence, less expenditure for purchased grains; a profit on raising as well as on feeding grain; and better distribution of labor through the growing season, thereby avoiding extra, high-priced labor at rush seasons, such as during haying time.

LOWER ANIMALS CO-OPERATING WITH MANKIND.

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The idea that I want to bring out touching the co-operation of the lower animals with mankind is that modern scientific methods are bringing to light many ways to utilize the forces of nature against the forces of nature, the beneficial against the harmful.

It was long thought that man must fight his way, against tremendous odds, simply using the animals and the plants about him in any way that was possible—for food, clothing, shelter, and transportation;—but the idea of inducing the lower animals to co-operate with man in fighting his battles is a new idea, and an interesting study. I know little about the modern methods used in the extermination of pests in the Californian orange groves; but right here at home are very interesting instances of the use of the animals and plants to fight against others and so to assist man in his struggle for existence. Now the idea of having regard for the lower creatures is very firmly incorporated and instilled into some savage and ancient nations. In fact the Parsees of India for centuries have deemed it a sin to kill any living creature, even a fly. That is a wrong attitude to take; yet even so, a respect for the works of the Creator exists in the hearts and minds of many of the lower peoples that more civilized races lack. We are coming to realize that we should have more regard for the brute creation, because our own safety, welfare and health depend upon our understanding how they can be injurious to us. Typhoid, yellow fevers, plague, sleeping sickness, malaria—all those maladies are attacking man and many are attacking animals which have lately come to be known to be due to living organisms, rather than to poisons circulating in the water or air. I well remember my experience in the Bahamas nine years ago, shortly after the mosquito-malaria theory was promulgated The Islanders were subject to malaria, yet were skeptical as to the relationship of

mosquitoes therewith. They had read in magazines and elsewhere that the mosquito carried that malady, but they did not believe it. They knew that breathing the miasmatic night poisons from the swamps and low places gave malaria. They could not be otherwise persuaded or led to subject their theory to scientific test. It is difficult to overthrow any long accepted theory as to the causation of disease.

Again this theory that the tremendous anemia and debility in the South is due to the invasion of a small, intestinal, parasitic worm is entirely new. Thousands of intelligent Southerners look upon it as a reflection upon them, a device of the North. Many southern newspapers, lawyers, and indeed, doctors, talk about Rockefeller's million-dollar joke. They will not believe in the hook worm; they deem it a slam at the South. We are all subject to prejudice, especially such as have not read widely; so many do not realize what harm is done to mankind by the lower organisms, both plant and animal.

Then again, we should be respectful to the brute creation because of the good it does us. We realize that many valuable products are afforded by the lower animals. For more than five thousand years animals have been domesticated and we have made various uses of them. Our ancestors wove their garments from wool or clothed themselves in sheepskins; camel's hair was roughly woven into a tent covering. In ancient Egypt and Babylonia, beasts of burden and food animals were depicted by their artists in stone. Silk worms have been cultivated in China for three thousand years, their favorite food cultivated, the silk spun from the cocoons and weaved into garments. And so, too, is bee keeping an ancient practise.

However, this new idea of hunting around to find insects for the distinct purpose of allying them with mankind, is a matter which has been but slightly looked into, and which seems to hold out enticing possibilities. An early example of the bringing of insects into allegiance with mankind in order to fight other insects was made in the Californian orange groves. The fruit was badly infested by a small scale insect which so sapped the vitality of the trees that the crop was almost nil. Many different sprays and washes were devised and used; but none of them could penetrate the hard scale shell. The insects were so small that they could not be picked off; so closely adherent that they could not be scraped off without spending two or three days on a single tree; so prolific that by the time they had covered one side they had spread and covered the other. There seemed no way of combating them by ordinary methods suggested by the experiment stations. Some bright chap discovered (we do not know who it was although this happened only a few years ago) that associated with this scale insect was a small fly-like insect which seemed to be doing no harm to the trees but apparently fed upon the scale. Careful observation disclosed the fact, however, that instead of feeding

upon the scales the fly was associating with them in order to lay its eggs in their bodies and that later, grubs, so small as to be almost invisible, hatched and ate out the vital parts of the scale, thus destroying its host. It would then emerge to the outside; make a little shell about itself; go into a quiescent state for a few weeks and pass from its shell-like covering to a form just like the fly that laid the egg in the scale insect. This was an interesting and most important discovery. Since that time many serious pests in orchards, gardens, and plantations have been successfully checked by recourse to this method. Hence the first thing, nowadays, that is done when a new pest appears, is to set some entomologist hunting for its enemies. An interesting instance occurred in Hawaii two years ago. You all know the cicada, the little harvest fly that shrilly stridulates in the fall on the trees. It belongs to a large family, which includes the cinch bug and these scale insects. They are all "bugs" in the narrow sense, with a proboscis or beak for sucking. They are hard to get at with sprays, because of their hard shells and because they do not feed on the outside of the plant, but puncture the bark and crawl within it into the very sap. They are unreachable by external spray, and cannot be poisoned from within, without killing the tree. One of these little bugs or cicadae suddenly appeared in the Hawaiian sugar cane plantations. Sugar is Hawaii's chief product. They export ten times as much to the United States as does Cuba. Hence the advent of a destructive insect is a tremendously important matter to the large and powerful Sugar Planters' Association. Entomologists found that this fly, this little cicada, was likely to prove a very serious menace, because, although it had just started its inroads, it seemed to have no enemies. It throve tremendously, did great damage and could neither be localized on or limited in its spread. The investigators scoured the world in an effort to find out whence it came; and they finally located it as an insect which had never been found or described in its native land, which was Borneo. Then they went to work to find some parasite or enemy. They hunted all over Borneo, but nothing came of it. They could find no insect, fungus, or other pest, that preyed upon it. But they kept at it, and in about eighteen months, found it in Sumatra, as well as in Borneo; and that in that island, it had a pest and an enemy. They carried this attacking insect over to the Hawaiian Islands and by its use successfully checked the inroads of the original pest. They are now able to hold the cicadae in check and very likely may have exterminated them by this time. Insects do damage one to another in divers ways; one I have already described, the laying of an egg within the body of the attached insect, which hatches out a voracious grub. Another ingenious device is that used by the wasps. Wasps, bees and hornets are the highest of all the orders of insects in point of intelligence, and efficiency. The colony of the bees with its workers, drones and queen, shows a much more advanced insect civilization

than anything we find among beetles or other insects. So amongst these highest insects we find most of these ingenious devices for parasitizing their fellows. They have a way of stinging the grub or larva of another insect by curling the body underneath that of the insect they attack and with perfect precision puncturing upwards through its body into one of the nerve centers which are all on the under side. How this instinct ever came to be developed passes our understanding; but in some way that has been accomplished. This puncture does not kill the grub but paralyzes it and puts it into a kind of hypnotic sleep in which condition it is seized and borne away to the nest of the marauder. The mud-dauber or wasp, which builds its nests plastered against walls, etc., does this. Inside their nests may be found grubs of wasps that are hatching out, feeding upon the bodies of these helpless, paralyzed, alive though motionless, victims. Many kinds of nests—of paper, plaster, holes in the ground—are built by these intelligent little insects, the wasps, in which is thus commonly stored up food for the young. Some kind of paralysis is produced in the victim which enables it to live quiescent for some time until the wasp eggs hatch out, becoming voracious grubs which need animal matter for food. Many noxious insects are thus preyed upon. The wasps do no harm, but the grubs they thus attack do.

Another creature, which is equally clever and is also a representative of this same high order to which the bees belong, has a regular well-digging apparatus hitched on behind, the *Thalessa lunator*. Three slender and extremely stout prongs come from a peculiar sloping tail piece and one comes down on the other side of the insect. It lays its eggs in boring insects in trees. It lights on some tree, flying on different parts of the trunk until it discovers a boring beetle or larva under the bark. Then, rigging up this gear, it drives a hole through as much as a half inch of solid wood in addition to the bark of the tree, exactly over the spot where the borer is located. After having forced this drilling apparatus through the bark and wood and into the body of the borer, several eggs, one after another are extruded from the body, carried down through the tube, thrust into the body of its prey and left there. Clearly, woodpeckers are not the only animals that attack borers. Sometimes if one strips the bark from fire wood or timber, one finds these boring insects. Their bodies will be as hollow as if they had been dressed for the market, with absolutely no soft parts left therein. This is the work of these insects. The eggs are laid within the body, the inner organs of which are all devoured by the many little larvæ. These larvæ get their growth, come out to the surface and then shed their skins for the last time. Hard wood trees are most commonly attacked, particularly the ash, oak, butternut and nut-bearing trees in general.

One often sees in the fall a caterpillar larva with little white tufts like rolls of cotton sticking all over the outside, being just about able to crawl, parasitized by another insect in a most interest-

ing way. The invading egg instead of being laid in the body of the caterpillar is laid in the egg of its prey. The eggs are shaped like little crucibles. One insect that is attacked in this way is the kind that feeds on woodbine, Virginia creeper, and the grape. Several moths are of this same family, e. g., tiger moths. The adult insect of the parasite is not much larger than is its egg. The egg is injected into that of the host, and it would not be any more than one-fiftieth as large. They hatch out in that egg but they do not damage it at all. The egg of the moth hatches out, carrying within its structure the hatched larva of the enemy; and then the two grow up together. One cannot escape the other by any means and the eggs that hatch out in a number of these receptacles will devour the grubs as they grow. After finishing that one they will fly to a stronger one and work their way into its body in the adult stage, so that a grub of one of these moths may have as many as a hundred of these parasites in its body that have come into it through the egg. They will live in there and here again a wonderful instinct is shown. Instead of doing damage to the grub that will kill it, they avoid the vital organs and live in the muscular tissues so that, it will not crawl about but can still take in food. Then they will finally, just before life is extinct in their miserable host, work their way to the outside, puncture a hole somewhere, come out and spin a cocoon, a little white tuft which you see all over the body. There are hundreds of them sometimes sticking onto the body of the larva and they will stay there until the young within is ready to hatch on the dead body of the host, and then a little lid comes off. opens up and the insect flies away.

In these many ways much good is done in destroying noxious insects by these ingenious devices of nature for parasitizing the eggs, the grubs or the adults of the noxious insects. Thus Nature works against herself and a wonderful balance is kept up. There are about as many cutworms and gypsy moths, about as many pests of one kind or another, now as there were ten years ago. The balance is well maintained, and parasitism is Nature's device for maintaining it.

Sometimes, owing to reasons that we can only partially understand, influences are brought to bear which kill many of the enemies of some particular insect. Frost or other weather conditions may kill parasites because they are not always tougher than the host. Then we have a tremendous scourge of that particular kind of pest. The gypsy moth, the army worm, once in a while some of the beetles that go down in the larva stage under the sod and clear the grass off by eating off the roots, occasionally multiply excessively. Such occurrences are due probably to influences that work, not especially for the welfare of the insect itself, such as increase of food supply, but to influences which kill its enemies, or which simply take their food away, thus weakening them and lessening their efficiency. Many insects multiply so rapidly that if their enemies were not able to keep them down, or were pre-

vented from doing so, and hence they were allowed to multiply as they naturally would, the earth would be overrun with them and not only animals, but man, in a few years, would be driven off the face of the earth. Many species are so prolific that literally there would be no way for man to live; hence it is by insects working against each other in Nature's way that this wonderful balance is kept.

Not only are insects of great use in keeping noxious insects of other species in check, but now we realize, as we did not a few years ago, what great allies we have among animals and mammals. Take the skunk for instance. No one has ever worked out thoroughly the economics of the skunk. It would be a most savory undertaking, no doubt. It would, however, yield some very interesting facts. Down here in Charlotte is a large gardener who claims that the skunks are his best friends. There are many skunk burrows all around his place, and he does not try to keep them out or get rid of them. (He doesn't keep chickens, however.) He likes the skunks because they come out at night and go about eating up grubs from grass, insects from roots and trunks of trees, and picking up beetles and flies falling to the ground from trees. There is no doubt that they do accomplish much. Field mice, also, while they will kill bees if they get a chance, are useful in such ways. Bats, too, come in this list. Let a bat get into the house and the ladies go out and get some man with a broom to put it out. As a matter of fact, however, much good is done by bats flying around all night killing mosquitoes, night flying moths, etc. They are voracious eaters.

Almost all of the mammals that we regard as vermin, although they may do harm, are highly beneficial. There is much room for scientific investigation of the good done by these lower mammals, just such as has developed our present knowledge as to the service of bird life. We would never have known what we owe to the birds had it not been for the investigations that are carried on in Washington by government experts on the stomach contents of birds. You would be surprised to know what myriads of birds are shipped in by the government collectors from various parts of the country, and subjected to examination. These men have attained great skill recognizing the different objects in the stomachs of the birds. They will pick up a little scrap of a brown shiny thing and without an instant's hesitation write down the correct name of the insect to which it belonged. They recognize in the stomach of a mole a little scrap of a wing, of an eye, a feeler, as belonging to a certain kind of insect. Weed seeds by the million are eaten by birds. You cannot trust your judgment when watching a wild animal feed, because, although robins will get into a strawberry patch and you will swear that they have not eaten anything but strawberries all their lives, if you killed them, and examined their stomachs, you might find enough insects and weed seeds eaten to make up for all the strawberries eaten in the day.

Even those animals which devour the greatest amount of our valuable products may be doing much incidental good. Even the detested English sparrow, while it is undoubtedly a curse, does more good than we realize in the destruction of weed seeds. One cannot tell by watching a bird what it is doing when one is not around. It may not be putting its best foot forward, just as we often do not. They are not trying to show off as most humans are apt to do, but are apt to do the perfectly honest, straightforward thing, whether they are watched or not. They have so many different interests that one cannot be at all sure that the act they are seen to do one afternoon is the thing they have been doing the two or three afternoons previous. Many of them have a much more varied dietary than we imagine.

There are laws in all states governing the killing of birds and much more needs to be done in this direction. We, here in the agricultural college, are trying to find out something of the good and something of the harm that is being done by the various animals of the state; and when your friends get up in the Legislature and utter sweeping statements and condemnations of any creature that is regarded as a pest, simply remember this, that you cannot be at all sure that one man knows the whole thing. While the cedar waxwing may do much harm to cherry trees in one part of the state, he may be doing good in another part. I do not say that they do, but I say there is a possibility of it.

Even such a humble animal as the common garden toad deserves our sympathy and encouragement. If we could know the number of insects of a harmful sort caught up by the tongues of the garden toads, we would be astounded. It has been seriously recommended that farmers take the trouble to protect frogs and toads in the spring when they are breeding, to give them moist places in which to breed and then, as soon as they are old enough to jump out and leave their tails behind them and go after insects, to put them in a place where they will grow and find all the food that they need. A certain investigator carried on a very thorough study as to the contents of the toad's stomach. He killed many thousands in his studies, a larger number it sometimes seems than was needed to get at the facts. He found that toads habitually got out under the electric lights at night, not just for the sake of sociability but for the purpose of gathering food. He caught four plump toads under an electric light early one morning, examined them, looked into their tables of contents and found within, respectively ten, eleven, fifteen and seventeen good-sized night-flying moths. Seventeen moths in the stomach of one toad is doing pretty well. Furthermore the processes of digestion soon dispose of the moths and the toads are out in search of more. Great numbers of the small slugs that do so much damage to lettuce, etc., were also found within the toads. During the tadpole stage, also, the toads do much good.

There is much poisonous and injurious stuff turned into good

clean flesh by the scavengers amongst the lower animals. All the way down, from the vulture and the carrion-eating dog of Egpyt to the microscopic animalcules swarming in our ponds, animal life is consuming these vile materials and turning them into good clean flesh that is not harmful, and thus benefitting mankind. Even the little mosquito larva which is a pest and a menace to health, disposes of much decaying, putrefying matter in the small stagnant pools. Mosquitoes in some cases and of some species are fatally dangerous; and yet there are others which thus undoubtedly do more good than harm.

And so we find in every group of animals some that are beneficial, some that are harmful, some working with, some against each other; and thus the wonderful balance is maintained. If we will but realize our opportunities as we are beginning to do, and utilize those things that are in our very way, making the animals that are our friends useful, we will save money and discomfort and the world will be better for our pains.

THE FARM HELP PROBLEM.

F. H. STADTMUELLER, MANAGER VINE HILL FARM, HARTFORD, CONN.

We all have witnessed with pleasure the vast growth and expansion of our country, and accumulation of wealth, particularly within the last three or four decades, although, to a certain extent, it has simply been the conversion of invisible wealth into visible wealth rather than the creation of anything that is really new.

Now let us see what New England agriculture has contributed to this condition of affairs. Although conceded by many that this prosperity has been achieved through opportunities afforded for the conversion of invisible wealth into visible wealth, various other factors have been important in bringing about these results. One of these has been the growth of the law of the division of labor and its application. It is remarkable when we bear in mind the age of the civilized race, how recent is the demonstration of this law and its far-reaching effects, disastrous effects upon agriculture.

By division of labor, I mean that rearrangement of affairs, whereby a man simply does one thing, is but one link of the whole chain. He is placed at a machine, and at the end of a week at the most has mastered all the requirements of that machine and becomes himself a mere machine. In brief, the work in many shops is now brought to the man instead of the man fol-

lowing the work through the shop, as was formerly the common practise. This has been the result of long years of industrial development, and has been exceedingly essential to the attainment of high perfection of efficiency attained at present. It has degraded the all-round man to admit more economical production. Now in a department store a clerk may be an expert in hosiery, neckwear or cotton prints, but knows little or nothing of the goods in other departments, whereas thirty or forty years ago he had to have a general knowledge. Now what has all this to do with its bearing upon agriculture? Simply this, that agriculture, because of the nature of its work, prohibits the application of this law of the division of labor. To apply it in the sense that has become possible in many other industries, is absolutely out of the question. Take dairying, for instance; it is inconceivable to think of starting men milking at seven o'clock and having them milk consecutively for ten hours and keeping it up, moreover for 365 days in the year. You can not conceive of a man preparing land for 365 days to plant corn on, or of picking apples for a year, or any other similar farm operation. Such a mental picture at once declares the utter impossibility of the application of the law of the division of labor to farm processes. What then follows as a natural and inevitable corollary?

Naturally the farm laborer should possess a greater degree of application, a greater breadth of view than is required of a laborer in almost any other industry. Another corollary to that proposition is that, other things being equal, farm labor is the most valuable and should be the highest paid. It is manifestly evident that a man possessing breadth of application, with attendant efficiency in various branches, is worth more than a man who can apply himself to only one line of work. Yet when we turn to the application of this principle, we have to admit that it is not recognized in agriculture.

Other factors arise that bear upon this question. However, before we pass from the matter of compensation, many may think the following a pretty broad statement, regarding the comparative rate of wages; yet it is, nevertheless, in accord with actual conditions. The common rate of wage maintained in many factories is nineteen cents an hour, for nine hours' work, about $1.75 per day, or $45.50 per month of 234 work hours. The current wage on dairy farms is thirteen cents per hour for a day of eleven hours, being $1.43 per day with Sundays and holidays, equal to 302 work hours. Labor is like everything else; it works along lines of least resistance. You will see how attractive the proposition is for labor to seek employment on the farm with 302 work hours per month as compared with 234 work hours at the factory, with an income of $39.25 as compared with a revenue of $45 a month in the factory.

It is urged that the gregarious instinct of man is to flock together, and hence the farm is at a disadvantage. This is not

altogether true. Although there is an element of truth in the statement that we do like to get together, it is equally true there are plenty of people that would like to work upon the farm, that would supply all the needs of the farm, if the farm would pay the same wage that the same degree of skill commands in other industries. I used to accept this idea of the effect of gregarious instinct, the lack of desire to go to the farm, as a very potent reason until 1907, when I had to abandon the whole theory. We were at that time at the zenith of prosperity in this country. The factories were offering premiums upon wages to attract the number and sort of men necessary to meet their own needs. Under those very conditions there were never two consecutive days but what from two to twelve men presented themselves at my farm and applied for work, showing a natural inclination to seek employment on the farm rather than in the city; but when it came to the matter of wage and I had to talk $1.50 to $1.75 per day, they left, saying they could get all the work they wanted for $2.50 a day, which was a fact. There was always a sufficient number of applications for work, but the prices received for our produce prohibited its employment at the rates which could be readily obtained elsewhere.

Another factor which has had a great influence, is the change in the character of the labor now available. Up to twenty years ago the farm labor was native stock, which was ahead of all the farm labor that this country has ever enjoyed so far as efficiency is concerned, in addition to which we had practically nothing but people from the northern countries of Europe, from Germany, Denmark, Sweden, France and England, Ireland and Scotland. In all of these countries, with the exception possibly of England, there is a strong regard for the schooling of the young, primary education is compulsory, resulting in a class of people possessed of a good degree of mentality. In the past twenty to twenty-five years a gradual change has taken place, which has now practically culminated. The present migration is more from the southern countries of Europe, people good at heart, perhaps as good as any class that ever lived; but because of the lax attitude of the government of those countries towards schooling, they are a class of laborers undeveloped, and lacking will power. Hence it is more difficult to direct and guide them in their work and an increased force of help is necessary. On the place that I am managing, using the old type of labor twenty-five years ago, I was competent to manage and to direct practically without assistance. Today, without any increase in area, largely because of the decrease in the intelligence of labor, we have to employ six foremen to block out the men in small groups, and to simply drive them to get anything out of them at all.

There is another factor that is of vital importance. The application of this division of labor drives back to the farm the poorest elements of labor that have offered themselves to the

factory. The labor employed in factories is confined or limited to small areas, where it becomes a very practicable thing to measure the amount of energy through the hours of its employment. How different with the farmer! We are working on broad expanses where the labor is necessarily spread out and careful supervision impossible, resulting in this; that that class of labor which is restless or resents close surveillance naturally drifts out to and seeks employment on the farm where conditions are less exacting. Being less exacting it means that such laborers deliver fewer units in a given time and the cost of production ascends again. Thus you will see, when measured by the units of energy required to produce and the skill necessary to the carrying on of the farm work, the cost of production becomes excessive.

The position in the employment of labor that now confronts us, indicates that the all-round man the manufacturer required thirty or forty years ago is an obsolete institution. He simply requires a man of lower brain power, who masters all the requirements of his allotted task in a few days; whereas, on a farm our operations have become intensified, more diversified, and require greater plasticity, ability of application and greater breadth of thought; yet notwithstanding we are paying lower wages than are paid by many, if not most all, other industries. You then have, I believe, brought to you in a clear, brief way the reasons why laboring on a farm is not a very attractive proposition. You also see why the boys and girls leave the farm. In my experience most boys and girls would much prefer to remain upon the farm. There is something that is ingrafted in human life that glories in nature, if we would or could only give it a chance to respond, but our boys are a little brighter than their parents and when they see the meager returns achieved by life on the farm, they drift to the city. We criticise the boy for going to the city and working on a trolley car for $12 a week; but he is earning twice as much as he can on the farm; and as long as he can do this I hope he will know enough to go and turn the crank, for, lacking such perception, he does not give much promise of success at farming.

It is more far-reaching even than that. You all know that we have not got to drive many hundred miles before we come to a farm where the buildings are all dropping down. There have been endless articles in the magazines trying to point out one reason and another why this has occurred. It is simply a question of dollars and cents. It is not because the farmer is so thick headed that he does not have the aspirations of the people in the cities; it is because he has not received enough for his products to surround himself with those pleasures of city life. We do not get enough for our produce, our milk and butter, so that we can even afford to pay a clergyman a good salary.

In 1907 I was up against the proposition just as we all were.

I could not get any labor and had 140 cows to milk. People would come for work, but they wanted $2.50 to $3 a day, and you know how far you can go on that at the present prices of produce. I could not pay it.

There is developing, in Hartford, a slum side, where unemployed people congregate in the cheap boarding houses. One day I was starting down to interview one of the boarding house keepers and to ask him to send me some of these fellows. On the way I had to pass one of the large charity institutions, and, being acquainted with the superintendent, I asked him if he had any men who wanted to work on the farm. He said he had seventy-five men, but that they were all degenerates. I asked him to have them lined up. They were all ages, from eighteen to seventy-five years old. All were wrecks. The point is this; there were seventy-five degenerate men lined up, and the superintendent said to me there had been thirty-eight farmers there during the last three days seeking for farm laborers. Think of it! When you bear in mind that on the average New England farm the laborer is taken into the family, and a farmer is compelled to go to such a place to seek labor. It is a wonder that the decadence of the New England farm has not gone much further than it has.

The neglect of buildings, imperfect tillage, children leaving the farm with the necessarily increasing hardships entailed upon those who have remained on the farm, all of which have largely been brought about by the unfavorable conditions of farm labor, in brief, indicate at least a portion of the contribution of New England agriculture to the great prosperity this country attained during the last two decades or more.

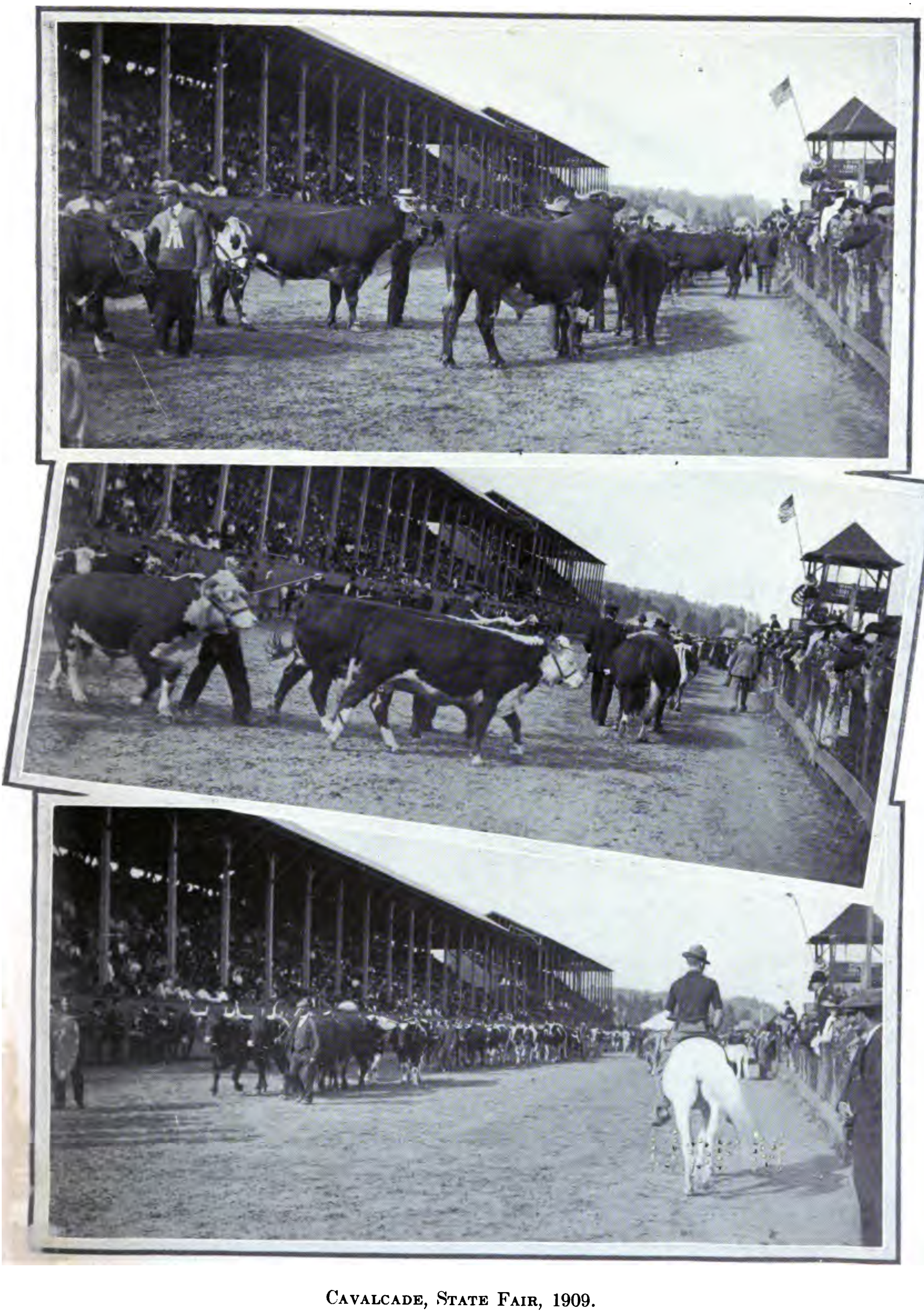
Fortunately the tremendous ordeal that we have been passing through is about over. It is self-evident that it is not altogether a question of labor. There are other factors that have helped the labor situation. It could not have been so had it not been for the fertile soils of the West. There are other factors, but of such minor importance that it is not necessary to dwell upon them. Fortunately there is a change taking place very rapidly.

It is rather amusing to witness the anxiety displayed by captains of industry, bankers, railroad presidents, etc., about the poor farmers, the present high prices of food being laid at the door of the farmer because he does not know enough to till his farm properly and raise enough food.

I am sorry to witness the movement going on for the establishment of demonstration farms. In the first place, you cannot get a finer demonstration than is the successful farmer, you cannot get a cheaper one, and you will find the ideal conditions exist there. The question is to pick him out. If the dairymen's associations, pomological societies, etc., would adopt different methods and offer premiums, not for products, but for farms for their general excellence, you would soon be able to point out these

Herding Sheep, State Fair.

A Glimpse of Vermont's Largest Apiary.



CAVALCADE, STATE FAIR, 1909.

good farmers. There is another thing that is bad about the demonstration farm movement, and that is the reflection it carries. Of course there are various ways of looking at all these things, but in the argument presented for the demonstration farms, it appears to me that the advocates thereof are to a large extent discrediting the work of our agricultural institutions; the work of the department of agriculture at Washington, the work of our experiment stations and agricultural colleges, of our dairy and sundry other associations, and, last but not least, of the agricultural press. The movement rests largely on the assumption that farmers are ignorant and that such demonstration work will overcome their ignorance. The farmer is not ignorant. Present conditions exist largely because the farmer has known only too well that the labor conditions were against him. I know full well that my farm is capable of producing two and threefold what it has produced for twenty-five years, and I have not stopped in my hope of doing it; but the main thing that has balked me in my endeavor has been my inability to draw the necessary labor at the prices I could pay. Now relief is at hand through the increase in the cost of living for the people who are the consumers. Therein lies our opportunity; we can afford to pay more for labor. In fact there has been an advance of twenty percent in the price paid for farm labor in the last thirty years but it has not been sufficient. We should pay $65 per month per man, when you bear in mind the degree of intelligence and the number of hours of work required per month. I am paying on my farm closely onto $50 and am not going to be able to obtain what I want until I can pay about $65. I think this advance in the cost of food products has come to stay, although it may not remain quite as high as it is in some lines. Beef will probably remain where it is; dairy products must advance; flour is not going to recede very much, if anything there will be a gradual acceleration for the next fifteen or twenty years. That will admit the securement of the required labor to allow more intelligent cultivation of our land.

There are two ways in which the labor problem can be met. One by concentration of effort to produce only high-grade quality of goods. That, in my judgment, for New England farmers is the most attractive, for there is quite a clientage that is anxious to draw unto itself only the most highly perfected food products; and being near that market, therein lies our opportunity, because the higher the price the greater the revenue, and you can pay more for the labor. The ruling price of milk in Hartford, is eight cents a quart. I get twelve and thirteen. We are paying at present $50, whereas the competing dairymen are paying only about $40. That gives me an advantage, and I draw unto myself a better class of labor. Through trying to improve the quality of your output and to increase your prices, a larger profit

is derived and it gives you a chance to draw unto yourself more satisfactory elements.

The other way to meet the situation, consists simply in such improvement of the physical conditions of your plant, as will allow the introduction of the maximum amount of machinery. A point too frequently neglected by many is the sum put into the construction of buildings, proper tools, etc. This brings up one of the broad basic principles of farming, and that is this: when you begin in business your capital resolves itself into two classes, the fixed capital and the active or circulating capital. The fixed is devoted to equipment such as land, buildings, tools, etc., and the circulating to employment of labor, purchase of fertilizers, seeds, etc. But the functions of these two classes are different. The fixed capital is incompetent of earning a dollar. The circulating capital must earn the interest, not only upon itself, but also upon the fixed capital. Other things being equal, the profit from a given plant is liable to decrease because of increasing competition. Under such circumstances the only way to maintain the rate of profit is by readjustment of the ratio of these two classes of capital. As profits decline the ratio must be contracted. If you had, under ordinary conditions, thirty or forty years ago, four of fixed to one of circulating capital, you have got to have today,three of fixed capital to one of circulating, or even a closer ratio.

AN ACRE OF POTATOES.

E. S. BRIGHAM.

We are told that science teaches us to know and gives us the heart to do. I wish to speak on the growing of potatoes in the field. The practical grower should appropriate all that science can tell him touching his enterprise, should form an ideal, should size up his situation, and then aim to reproduce those conditions, so far as may be, on his field.

I shall speak about two plots of potatoes, the Gold Coin and the Irish Cobbler, not because these varieties are of necessity better than any other potatoes, but simply because they have yielded me a fair profit.

The Irish Cobbler were planted upon a clay loam soil, land which a few years ago was declared to be worthless because of the water held by a hard clay sub-soil. This was tile drained at an expense of $50 per acre and has been one of the most productive fields on the farm. It was also full of witch-grass; but as soon as

we were able to get onto it I put four horses on a double action harrow and harrowed it twice. This destroyed the witch-grass and changed the appearance of the field very much. As soon as possible we plowed this land, went over it with a double action harrow, and levelled it with the smoothing harrow. Witch-grass gave us no trouble from that time on; no hand hoe was used, and the subsequent cultivation with harrow and cultivator kept it in check. We plowed from six to eight inches deep. I would have ploughed deeper, but could not on account of the hardpan.

I like to use medium-sized tubers, and am very careful to store them during the winter in a cool place. They are stored in the cellar, and by opening up the cellar during the cold weather I kept it as near 33 degrees as possible. This keeps the tuber hard and firm, and in the spring it is in fine condition for planting. As soon as growth starts in the spring we take the tubers to the barn and soak them in a solution of formalin—one pint formalin to thirty gallons of water—for about two hours, then spread them on the floor to dry, leaving them spread out if we can until the sprouts start a little. We cut the tubers to one good, strong eye, provided that eye is supported by one good, solid piece of flesh.

The planting is done by a planter. Unless one is planting upwards of three acres it does not pay to use a planter. Good results may be attained by using a shovel plough. We used to distribute the fertilizer with a corn planter that made the rows at the same time, and by running the shovel plough in that row opened it up about three inches deep, then by putting the shovel plow in the center, bringing the dirt back covering up the rows. Our planter distributes the fertilizer, opens the furrow, drops the tuber, and covers it up at one operation, and at a much less cost than can be done by hand.

We use a home-mixed fertilizer made of 300 pounds nitrate of soda, 700 pounds tankage, 600 pounds of acid phosphate, and 400 pounds sulphate of potash. This will analyze 4.1 percent nitrogen, 9.1 percent phosphoric acid, and 10.4 percent potash. That fertilizer will cost this year, if bought in carload lots, about $31 per ton. The analysis is very high, and by buying chemicals in that way you get a good deal for the money. Muriate of potash might be used and cheapen the fertilizer a little. If you are using ready-mixed fertilizer I would advise you to buy the highest grade brand you can get. If you can get one that will analyze nearly as much as the one I used, it will cost you probably about $10 more per ton. Fertilizer, up to 1000 pounds, is used entirely in the drill. If I were going to use 2000 pounds I would put 1000 pounds in the drill and spread 100 pounds broadcast.

You will remember that our field has been left with ridges over the rows, whether we have used the planter or covered with the shovel plow. Shortly after planting we go crosswise of those ridges with a smoothing harrow that levels down the ridges and kills the little weeds. Then we let the field lie for a few days and

go over the same operation again. That is the cheapest weeding you can give the field. This procedure is continued until the sprouts are nearly up, or until there will be no danger of breaking off the little sprouts. After the sprouts are up we cultivate with a heavy cultivator, working as close to the rows as possible, and quite deep. Perhaps we do that twice at intervals of a week, and after that the little roots have grown out so far that injury will probably be done by deep cultivation. Then we use a spike tooth cultivator. Our cultivator has thrown a little dirt around the plant and made a hill, but not hilled in the sense that potatoes usually are. We cultivate throughout the entire season or until the vines cover the field. In this way we maintain a dust mulch all through the summer and conserve the moisture. A potato crop of 225 bushels to the acre will remove 220 tons of water from the soil, so you can get some idea of how much water it is necessary to have.

Spraying is one of the most important features of the whole work. The Vermont Experiment Station for the past seventeen years has made an average gain of 113 bushels to the acre sprayed fields as compared with unsprayed. In the face of this fact we can not afford not to spray our fields. Late varieties should be sprayed six times and the early varieties four times. The bugs by putting in their appearance give the signal for the first spraying. Almost every one has to spray for the bugs, but there is a little field beetle very much smaller than the Colorado beetle, which bores the leaves of the plant full of holes. Poisons have no effect upon it, but this beetle does have an appetite for bordeaux mixture; and for that reason I spray with bordeaux mixture at the same time I do with the paris green. This last year we had very little trouble with either the early or late blight, and spraying did not make so very much difference; yet the bordeaux mixture seemed to have a tonic effect. I know that we sprayed the field all over once, and had enough left in the sprayer to spray four rows the second time, thoroughly covering them with an extra coating of bordeaux. They remained green very much longer than did the others; the second spraying prevented them from prematurely ripening; and the yield was very much greater.

The following two tables show the cost per acre of planting, caring for and harvesting the Gold Coin and Irish Cobbler potatoes this last year:

GOLD COIN POTATOES.

Plowing and fitting		$ 6.00	
Planting		3.00	
Seed, 20 lbs.		18.00	
Fertilizer, 1000 lbs.		16.00	
Tillage		7.00	
Spraying, 6 times		11.10	
Digging		12.00	
Rent of land		6.00	
Total Cost		$79.10	
360 bu. at 50c	$180.00		
Profit			$100.90

IRISH COBBLER POTATOES.

Plowing and fitting		$ 6.00	
Planting		3.00	
Seed, 16 bu.		14.40	
Fertilizer, 100 lbs.		16.00	
Tillage		6.00	
Spraying, 4 times		7.40	
Digging		8.25	
Rent of land		6.00	
Total Cost		$67.05	
207 bu. at 75c	$155.25		
Profit			$88.20

The cost of digging, picking up and drawing to the car or storehouse is about four cents a bushel on a 200-bushel crop, and a little less on a crop of 300 bushels.

Up to this present time I have been growing potatoes for the early market. Perhaps some of you who are located near a large town or city will be interested in the method of hastening the maturity of early potatoes. About the last of March I take potatoes from the cellar, soak them in the formalin solution, and put them in trays, made of lath, that are 4 feet by 18 inches. Each tray will hold about one bushel if the potatoes are spread out in a thin layer. These trays are put into a rack which holds nine of them, one rack piled above the other, and the racks placed in a warm, well-lighted room so that the light will penetrate to all parts of the trays. In a very little time the sprouts appear, not the ordinary white, sickly ones that appear in the cellar, but dark green, full sprouts which continue to grow until about the tenth of May when it is time to put them into the ground. At this time

we have a sprout up to one and one-half inches in length and one-fourth inch in thickness, and a little leaf at the apex all ready to unfold, while at the base of the sprout is a little row of embryo rootlets ready to push out as soon as they come in contact with the earth. We take these trays to the field in spring wagons, the potatoes are cut to one good strong sprout and planted, being covered with about two inches of earth, or more if there is danger of freezing the tubers. If the weather conditions are right and a warm rain follows the planting, in an increditably short time the tubers will send out little roots from one to seven and one-half inches in length. Soon the leaf will appear above ground, and a well-developed root system is found if the set is dug up. I have never had any trouble in getting into the market at least two weeks earlier with potatoes grown by this method, than with potatoes grown by any other method. By this method our gross income per acre has been about $200, but I have never had more than one acre planted in this way.

The breeding of the potatoes is a very important thing. It is something that I know little about, but something about which I have been trying to find out. Some plant breeders tell us there is no way in which we can improve varieties of potatoes by selection. They say that a tuber is reproduced by bud cuttings, that one bud is as good as another, and that selection has nothing to do with it. If you have definitely in mind the kind of potatoes you want to produce—one that will set five or six tubers to a hill—and grow them to uniform sizes, the plant breeders tell us to go into the field and note the growth of the plants through the growing season, to pick out those that are an average in growth, and to mark those hills. Then, when the crop ripens, you are urged to dig these chosen hills by hand, to select those hills that come up to your ideal, and next year to plant the tubers from those hills in rows, so marking them that you can identify them. Then, when digging the next fall, by further selection of those tubers that come up to your standards, perhaps you will get a hill of potatoes that will reproduce the kind you have in mind. You can multiply the crop from year to year until you have thousands of bushels originating from that one hill. I do not know about this by actual experience, but that is the idea from the statement of plant breeders that I have gained.

There is an opportunity to grow potatoes for a fancy market. I was talking with the steward of a hotel in Washington the other day and he said that if he could get the right size of potato, free from bruises, packed and sorted carefully, that he would be willing to pay five cents apiece for them. That would mean about $4 per bushel, They must be of uniform size (weighing from eight to ten ounces), handled with the greatest care, and packed in boxes.

DISCUSSION.

Do you apply fertilizer before you plant or when the potatoes are first coming up?

Before we plant.

Did you ever broadcast?

Yes, last year.

Did you uncover all of the potatoes that you covered up to prevent from freezing?

Yes, practically all of them.

Do you think that the larger quantity of earth would check their growth?

Yes, I think it would. You want to get the leaves out as soon as possible.

You spoke of the pulp of the potato feeding the roots: Have you had trouble with those tubers remaining whole and not seeming to decay?

Yes, we have found a lot of them.

Have you ever noticed any difference between the seed from the butt end and the seed end?

Yes, the seed will start first from the seed end.

Would you not cover more than two inches?

Yes, in ordinary planting, but not when I am hastening maturity. Some field potatoes I would cover six or seven inches, but that calls for harrowing and leaves them three or four inches deep.

Would you advocate that depth for a sand loam?

You would want them as deep as that if not deeper.

Do you cut your potatoes fresh as you plant them?

I like to, and have given away potatoes that were cut up before. Last year I planted some that had been cut a week and a half and I saw no difference between those and the ones that were cut fresh.

Do you cut these potatoes that you force after they have sprouted?

Yes.

POTATOES AS A NEW ENGLAND FIELD CROP.

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In connection with the subject of potato growing for New England I have had opportunity to make a good many observations in our eastern states and in some of the central western states, and from these observations I have been able to draw some conclusions as to the processes that are proving profitable.

The last ten years' average yield of potatoes in the United States has been between 86 and 87 bushels to the acre. In New York State the average yield has been something like the same. In the islands of Great Britain the yield has been some 194 bushels, and in Germany over 200. In this country, in Maine the average has been over 170 bushels, and for the past two years, 225 bushels to the acre. My observations have led me to believe most fully that this is not owing to special local advantages of any place, but rather to systems; for we find in Maine a system that has been developed, probably in Aroostook county, and from there adopted all over the State of Maine more than in any other State I know of in the East. I find that that same system is used with very similar results over all the northern and eastern states, by individual farmers or by groups. On Long Island, in Central Vermont and Southern Michigan, I saw one and the same system worked out with good results.

I propose to tell you the essentials of that system and a little of the modifications they are making of it in other localities. The Maine potato growing is built on a three-year rotation. If for no other reason, the growers would do this to get the greatest amount of land for the potato crop. They follow potatoes with one year of grain and seed clover and timothy with the oats; cut timothy hay one year, plow in the fall, and plant to potatoes again in the spring. On the whole I think the keynote of their success has been the clover sod which they have plowed under. In northern Maine, though the season is a short one, the second growth is big enough to pay for plowing under and the clover sod that has been turned over becomes well started on its way to decaying. In the spring they go on that land and harrow it very thoroughly. The most successful farmers are harrowing four or five times regularly, two trips with the cutaway and two with the spring-tooth, and a finishing trip with the smoothing harrow, planting in the latter part of May (and in other parts of New England you can advance that considerably), and it is done entirely by horse machinery. The potatoes are planted and the fertilizer applied at the same time with a type of horse planter which will put in four to five acres per day and distribute fertilizer at the same time. This fertilizer is almost uniformly high grade and contains three to four percent of nitrogen, seven to eight percent of phosphoric acid, and eight to ten percent of potash. The quantity that has been found suitable is as high as 1,500 pounds in nearly every case. The fertilizer mixed would cost something like \$35 or \$38 a ton, but to mix an equivalent of it would not cost more than \$27 or \$28 a ton.

The potatoes are planted in rows about 32 to 34 inches apart, and the seed dropped from 12 to 16 inches apart in the row so that the crop covers the ground entirely. The rows are continuous, no hill method of cultivation is used. The seed required will be about four and one-half barrels or nearly 13 bushels per

acre. The cultivation begins almost at once. As much cultivation as possible has been done before the crop has been planted, but if a man has 40 acres to plant it will be time for the team to go to work and cultivate when through planting.

In the northern sections, where the rainfall is abundant, the horse hoe is used for the first trip and is followed by a two-horse sulky cultivator, and that by the horse hoe or some other hilling apparatus until about five to seven cultivations have been applied to that land, alternating between hilling and cultivating. As you go farther south in New England it would become necessary to avoid this hilling as much as possible on account of lack of moisture. The level cultivation that they use on Long Island simply commences with the weeder and is followed with the two-horse cultivator so as to save as much of that moisture as possible. This cultivation will last until the vines cover the ground, and before it stops it will be necessary to begin spraying.

With 75 to 100 gallons of bordeaux mixture per acre, it needs three to five applications to protect the crop from the first of July until as late as possible in the fall. One of the most inexpensive ways of applying paris green is to mix it with the bordeaux mixture. The spraying is not always done thoroughly up in Maine, but they have learned a few lessons in the last three years, and the men who are spraying thoroughly have, in the face of hard seasons, kept their yield up somewhere near to normal, which should be 100 barrels per acre. This past year they are losing heavily up there, but it is very evident that the spraying was not sufficiently thorough to meet conditions as they were last season.

Several pathologists have watched that situation pretty closely and concluded that such was the trouble. They stopped spraying in the middle of August and the vines stayed green, but there was enough blight to do the damage, for just before digging time there was a heavy rainfall followed by warm weather, and the result was that the potatoes rotted in the ground. The pathologists have told me that a more thorough spraying would have prevented the development of those blight spores.

The potato growers in Maine are digging their potatoes by horse power. The machinery to do all the work of growing the crop will cost some ten times as much as to do it by hand, assuming that the hand method required a plow, a harrow and half a dozen hand hoes, while a full equipment of horse machinery will mean a planter, a digger, a spraying machine and two two-horse cultivators. One team can take care of 20 acres through the season.

The storage becomes the next necessity in a section like Northern Maine, and this is necessary for any man or locality which is growing potatoes extensively. A great many of the growers own their own potato cellars have them built in a side hill. The first requirement in storing is, of course, to keep the frost out, and next to have good ventilation. Lack of suitable ventilation is one of the difficulties to be watched out for in Vermont.

The cost of raising potatoes under the method used in Maine is about $60 an acre, including $24 or $25 worth of fertilizer, nearly 13 bushels of seed (four and one-half barrels) and the plowing, harrowing, cultivating, and spraying, and both labor and materials. With land rent added this will bring the cost up to at least $60, but one should average 100 barrels (275 bushels) of potatoes at this cost, and sell them for $1 a barrel. The farmer there will make $40 an acre on a crop that requires a good deal of heavy work. In many other parts of New England potatoes have been proved to be more profitable than this because, for one thing, the crop was marketed to better advantage.

We here in the North have got to furnish the seed for the rest of the United States. Potatoes are grown all the way to the Mexican line and growers can not raise their own seed in a great many places south of Virginia and Maryland, and only for a year or two if they do. So the chief source of seed potatoes is from Maine to Minnesota.

It has been assumed that any variety of potatoes was bound to run out in from 20 to 30 years, and there are only a few really old varieties that are much used today. Early Ohio, for instance, has been used to some extent for 50 years or more. There may be several reasons for this running out, but one thing is the fact that so many potato growers use their cull potatoes for seed. I have been doing some work along a line which makes me think there is another difficulty comes in there. A cull potato cuts more economically and plants with less waste, but the chances are that a cull potato cuts down the yield of the hills grown from it, for if you have two hills, one with six good tubers and another with two good tubers and four or five culls, you see what kind of hills all the small tubers must come from. Work at some of the experiment stations has gone to show that more careful selection of material from which the seed came would help keep up the producing standard of the better hills in a field of that variety.

I have selected for myself three different varieties of potatoes with the purpose of getting a hill that contained six merchantable tubers and no waste, not ever allowing a hill to go through that had more than one cull potato, and no hills that had coarse prongy potatoes. The first year I could get only about eight hills out of 100 to meet this standard. The second year the seed saved was planted in a separate row and I got 18 per hundred hills that met the same standard as the year before. The third we had 24 per hundred that met the same standard, and that seed will be tried again. I am inclined to think that after four or five years of this it will pay a man to keep only the best hills for planting his seed patch the following year, and use the rest of the product of his selected seed to plant the regular field crop.

The particular points to be remembered in raising a potato crop in Vermont are: a short rotation, furnishing clóver sod on

which to plant the crop; thorough cultivation, especially before the crop is planted; thorough spraying with bordeaux mixture; and the use of machinery throughout, in order to reduce the cost of growing to the minimum.

LIME AND LIMING.

JOSEPH L. HILLS, DEAN AGRICULTURAL DEPARTMENT, UNIVERSITY OF VERMONT.

The word "lime" as used in agriculture is applied to several different products. Thus we have caustic lime, slaked lime, limestone, phosphate rock or floats (phosphate of lime), gypsum or land plaster (sulphate of lime), and sundry wastes such as lime kiln ashes, gas house lime, etc. There is much popular interest today in the use of lime, a recrudescence as it were of an old-time practise.

Lime was used 2000 years ago. It has been held through the ages in uneven esteem. At times its use has been favored, at times decried. It has been regarded as a panacea and as a devastator. In some sections it has been and is still largely used; in others slightly or not at all; and under some circumstances its use has been forbidden. When the writer was a student in the Massachusetts Agricultural College thirty years ago, he was taught that "lime makes rich fathers but poor sons"; that lime was a dangerous material, to be used with extreme care or not at all. Nowadays in many sections and for many purposes lime is considered to be the salt of the earth.

The reason for these divergencies in practise and in views is doubtless to be found in the fact that its dangers have only recently been thoroughly appreciated and its services only of late clearly apprehended. Lime is a good deal like Governor Hoard's famous razor, with which one may shave himself or cut his throat, according to the way it is held. It may do damage or be helpful according to the manner in which it is used.

NATURE AND SOURCE OF LIME.

Lime, that is to say caustic burnt or quicklime, is derived from the burning in a kiln of some form of carbonate of lime, such as limestone, chalk, coral rock, oyster or clam shells. This lime, then acted on by water, swells, bubbles, and steams; the water enters into chemical union with the lime, producing great heat; and the final result is a fine powder known as slaked lime. Burnt lime which is exposed to the air similarly slakes, absorbing from the air water as well as carbonic acid gas.

Limestone, from which a large share of the commercial lime is made, is a derived rock, probably formed from the older silicates such as feldspar, under the action of various weathering and decomposing agencies of the atmosphere which have altered, dissolved and washed them away to the ocean. Most of our limestone areas of today are apparently of seashell origin, upheaved from the ocean bed, although so altered through the ages as to make difficult the detection of their original character.

Limestone is burned in heaps or kilns at a high temperature. This drives off carbonic acid gas, sulphur, water, organic matter, etc., leaving the oxid or burnt lime. One hundred pounds of ordinary limestone loses rather more than one-third its weight of carbonic acid and some water, while from two-fifths to one-half its weight of quicklime remains behind, together with more or less magnesium oxid and impurities. Limestones, as well as the limes made therefrom, vary greatly in quality and particularly in their lime and magnesium contents. A bushel of quicklime may weigh anywhere from 60 to 100 pounds and the product may be an almost pure calcium oxid or quicklime, or be very highly charged with magnesium oxid, and more or less valuable for agricultural as well as for industrial purposes, according to its quality. A fat lime is one containing less than 10 percent impurities, one which swells from two to three and one-half times in slaking and which needs a considerable amount of sand to make good mortar. A meager lime is one which may contain as high as 25 percent impurities and is more sluggish and more uneven in its slaking. Hydraulic limes contain from 25 to 35 percent of impurities, swell little in slaking and set. Hydraulic cements are those that may contain from 35 to 60 percent of impurities, which neither slake nor swell, and which may set at various times ranging from almost immediate setting to several hours. "Agricultural lime," so-called, is usually a low grade forming a non-hydraulic lime.

Types of Lime. The following matter taken directly from Bulletin 99 of the Vermont Station describes briefly the various forms of lime used in agriculture.

"Lime is used in agriculture in its three more common natural forms and in several artificial ones. The natural ones are:

1. As carbonate in limestone, marble, chalk, some marls, coral, oyster shells, etc. (compounds with carbonic acid, the gas of the 'soda water' of the druggist, formed from carbon and oxygen).

2. As sulphate in gypsum or land plaster (a compound with sulphuric acid and water).

3. As phosphate in phosphate rocks of various kinds, Thomas slag, bones, etc. (a combination with phosphoric acid).

The artificial forms of lime are:

1. As oxid, in burnt lime, quicklime.
2. As hydrate, in water-slaked lime (lime and water).

3. As an impure hydrate mixed with carbonate, in air-slaked lime (lime slaked by the damp air and gaining both water and carbonic acid therefrom).

4. As an impure carbonate, in ashes of sundry sorts (combined with the carbonic acid formed by the burning of woody matter).

5. As phosphates carrying varying proportions of lime (formed by the use of sulphuric acid in the manufacture of superphosphate or acid phosphate from rock, bone black, etc.).

6. As sulphate (formed as in 5).

Concerning the natural forms it may be said:

1. *Carbonate. Ground limestone or oyster shells* are plentiful and cheap. The lime they contain is not as available as is that in other forms and the various and somewhat complex functions of lime in plant growth and as a soil ameliorant are less readily exercised.

2. *Sulphate. Gypsum or land plaster* is a well known and largely used soil amendment, which deserves a still larger usage. It is mined in Nova Scotia, Central New York and elsewhere, where it is ground to a powder prior to use. Its functions are somewhat akin to those of the other and more active forms of lime but are sufficiently distinct to merit particular notice.

3. *Phosphate.* While *phosphate rock* is mined and *bones* gathered and ground mainly for the phosphoric acid they contain, their lime content is a factor of some importance. When in the phosphate form it furnishes lime to the soil, but this lime does not help materially in other ways. Low grade rocks, however, are apt to be rich in carbonate of lime and such are often helpful on acid soils.

Concerning the natural forms it may be said:

1. *Oxid. Quicklime* is derived from the calcining or "burning" of limestone or oyster shells in a kiln, the carbonic acid gas being driven off by the heat. The oxid thus formed is very alkaline in its nature, absorbs water and carbonic acid from the air with eagerness, and "slakes" with the production of great heat when brought in contact with water. This heating is caused by the intense chemical action of the water upon the lime. Quicklime is the most energetic form of lime, capable, in its own or its potential shape, of doing anything that any form of lime, other than sulphate, can do. Hence it may well be called *available lime.*

2. *Hydrate. Slaked lime,* as such, is used but little in agriculture. Its action is much the same as that of air-slaked lime.

3. *Impure hydrate and carbonate. Air-slaked lime* is perhaps the most common form used in those regions where the custom of liming obtains. Quicklime slowly changes from the oxid to the hydrated (or watered) form through the action of the air, absorbing at the same time more or less carbonic acid therefrom and thus becoming less virulent in its action. Complete slaking seldom occurs. Like the oxid this form of lime is an active one and may well be termed *available.*

4. *Impure carbonate.* *Ashes* contain usually from 30 to 40 percent of lime as carbonate, which is sometimes termed "vegetable lime." It is an active form of this ingredient, albeit a somewhat less energetic one than those mentioned above. Ashes furnish a form of lime which is probably *quite as available* as any and, if not too costly, often prove a desirable purchase.

5. *Phosphate.* *Phosphate of lime* treated with an adequate quantity of sulphuric acid forms more or less free phosphoric acid, monocalcic (or soluble) phosphate, dicalcic (or reverted) phosphate, and sulphate of lime; and usually some triclacic phosphate remains unaltered. About one-third of the lime in such materials is left united with the phosphoric acid, while two-thirds joins with the sulphuric acid. The lime in these altered compounds is *more or less soluble in water and all of it is quite available.* It is less powerful in some ways than the other forms above referred to. Basic or Thomas slag is too little used in this country to call for attention here.

6. *Sulphate.* The artificial *gypsum or land plaster,* formed as mentioned under the last heading, has, so far as is known, the same effect in fertilization as the natural material."

WHAT DOES LIME DO?

Nitrogen, phosphoric acid and potash are the ordinary deficient elements of plant food. Plants use large quantities and soils become more or less denuded of the available forms thereof. This is why they are used in fertilizers. Materials containing these plant nutrients constitute the so-called direct or nutritive fertilizers. Lime, on the contrary, is not as apt to be deficient, although occasionally it is relatively lacking. Lime is very soluble and is sometimes washed out even of a limestone soil, so thoroughly that there is positive shortage. However, it is more commonly applied as an indirect fertilizer, one which is used not so much to make good a soil deficiency as to promote plant growth through its indirect action upon the soil, whereby its physical characteristics may be altered, its biological character improved, or its chemical composition modified.

THE EFFECT OF LIME UPON SOILS.

The direct and indirect results secured by liming soils are many and complex. They may be grouped, however, as follows:

1. Its effect upon the mechanical composition of the soil.
2. Its effect upon the chemical composition of the soil, more particularly as regards the amount and proportion of plant food present or as regards the presence of materials injurious to plant life.
3. Its effect upon the biological character of the soil, upon the nature and vigor of its micro-organic life and of the crops growing therein.

Mechanical effect of lime. Lime tends to open up a clay soil, to increase its porosity. When added to a heavy clay it serves to gather together the fine particles, to make it lighter, more rapidly worked, more permeable by water, more crumbly, less likely to puddle, more friable. It favors not only the percolation of water but likewise its capillary movement. If, however, too much lime is used, or it is used too frequently, a sort of mortar is made and the soil may be seriously injured. This, however, is not very apt to occur.

Most paradoxically, lime tends to bind sandy soils together, to make them more compact, more absorbent, more retentive. However, this effect is relatively minor as compared with its more pronounced effect upon the heavier soils.

Chemical effect of lime. Lime liberates plant food from the soil. It is on this account that its free use in England upon rented farms has been prohibited and has given rise to the old proverb, hitherto quoted, that "Lime makes rich fathers and poor sons." In some way not clearly understood, the heavy usage of lime tends to set free certain forms of plant food, more particularly phosphoric acid and potash, and consequently leads to their more liberal usage in crop growth.

However, while there are dangers in the use of lime, on the other hand it may, when properly used, be of great service. But a small proportion of the total plant food in the soil is soluble. Lime is one of the keys which renders some of it available. Potash though present in all soils in large quantities, exists in insoluble combinations. The usage of lime, however, tends greatly to favor its solution. Many theories have been advanced to explain this occurrence; a plausible one being that the usage of lime tends to promote the formation in the soil of lime phosphates rather than of the more common iron phosphates and, in the case of potash, to replace it in the molecule. However, regardless of the theory, the facts are quite beyond dispute.

Lime tends to render relatively innocuous some of the poisonous iron salts which occasionally are found, particularly in ill-drained soils. Iron is a common soil constituent and ordinarily occurs in a non-poisonous form. If, however, the soil is not well aerated, the action of rotting vegetation, etc., tends to deoxidize the iron, changing it into what is known as a "ferrous" condition, which is a plant poison. Lime, however, tends to precipitate these ferrous salts and to make them insoluble, hence harmless.

Great stress has been laid of late years upon the service of lime in the correction of soil acidity. Soils are derived from rocks and naturally partake of the nature of the rocks from which they are formed. Furthermore, either because of ill-advised cropping or of the over-usage of acidic forms of fertilizers, or through the excessive accumulation of the debris of plant life, the over-use of muck, or for other reasons, many of our Eastern soils are apt to become acid. Other soils, particularly in the far West in the

arid and semi-arid regions, through an over-accumulation of plant food and lack of natural drainage, become alkaline. Many soils are essentially neutral, neither acid nor alkaline. However, acid soils are quite common throughout the upland regions of New England, and, regardless of the cause of the acidity, are not in a condition wherein maximum crop growth is possible. The reason for this may be briefly stated as follows: The preparation of organic materials for plant food purposes, the gathering of nitrogen from the air, and not improbably the solution of mineral plant food itself; these are all brought about, in part or wholly, through the agency of bacterial life. Soil bacteria cannot thrive, cannot multiply, in an acid soil. An acid soil then is not one fitted for bacterial growth and consequently not fitted for adequate crop growth.

Soil acidity is corrected by the use of lime or ashes, just as is the acidity of a dyspeptic stomach corrected by baking soda. When applied for this purpose, it is put on either as quick lime, or slaked lime, or in the milder form of carbonate of lime; but not as phosphate or sulphate, neither of which have any power whatsoever to neutralize acidity.

Soil acidity may be recognized by the litmus paper test. If one lay blue litmus paper, which may be obtained at any drug store, against a clump of damp soil, leaving it there for five or ten minutes, it reddens if the soil is acid. One, however, has to be careful not to touch the paper with the moist fingers as the perspiration is acid. Perhaps the best way to conduct this test is to make an ordinary mud pie with a clean water (preferably rain water) which by no chance is itself acid, and then with a clean, dry knife blade to make a section in the pie; opening it, putting the paper in the cleft, closing it; and then after five or ten minutes removing it, rinsing it with clear rain water and observing the tint. If reddened, the soil is acid and lime is likely to better it.

Biological effects of lime. The relationship of a slightly alkaline reaction of the soil to its bacterial life has been indicated. Readers particularly interested in tracing this relationship are referred to bulletin 130 of the Vermont Experiment Station, which goes into this matter in great detail. Suffice it here to say that nitrification and nitrogen fixation, two most important soil processes, are inhibited if the soil is acid. Lime, in rendering the soil alkaline, favors both of these processes.

Lime tends also to decompose humus, to render inert matter more available, and in particular to free nitrogen, to promote nitrification. It further serves as a base with which nitric acid thus formed may unite.

Lime has a very distinct effect upon the character of the vegetation. Where lime or ashes are used a marked change is apt to occur in the kind of cultivated crops which may be successfully grown, and, indeed, in the character of the weeds. Also an improved growth of the more valuable grasses occurs,

clovers grow more readily, sorrel tends to disappear and wild blackberries, etc., are less in evidence. One passing from a non-limestone to a limestone soil notes readily these changes in vegetative characteristics. This is well seen in passing from north to south across the State of Kentucky, where both the major and minor vegetation, the tree growth and the grass growth, change according as the soil is or is not of limestone origin.

Lime has relationship to the growth of certain plant diseases, pests, etc. For instance, potato scab is much worse on soil which has been limed than on one which has not been limed. That same alkaline condition which favors bacterial growth favors fungous growth. Hence it is not wise to use lime immediately before planting potatoes.

The effect of lime on plants. The specific effects of lime upon plant growth appears to be to strengthen to some extent the cell walls, to modify the form of the plant, and possibly to neutralize some of plant acids. Grains and grasses which are grown upon relatively limey soils seem somewhat less likely to lodge than those planted on soils poor therein. When grown upon soils rich in lime they are likely to be more compact, shorter jointed, denser topped, than those grown upon soils relatively lacking in lime. Foliaceous crops, roots, grains, grasses, legumes, clovers, are apt to be helped by lime; millet, red top, and blackberries to be injured; while corn and potatoes are apparently not affected one way or another.

PRACTICE OF LIMING.

When to lime. In general it is wise to use lime in connection with or well before the planting of lime-loving crops such as roots, foliaceous crops other than corn, clover, and legumes; but not before the planting of those crops which are injured by lime such as potatoes, millet, rye, etc. Ashes, marls and other carbonates, as well as gypsum, or land plaster, may be used at any time of the year without injury, but the fall is the safest, possibly the only safe time to apply on most soils the more acrid forms, such as quick and slaked lime. Acid or peat soils may often be benefitted by large applications in the spring, but ordinarily the fall is much the safer time. These stronger forms of lime, if applied in too large quantities, particularly in the spring when there is little time for them to be altered through exposure to the air into milder carbonates, may act so vigorously as to endanger vegetation and indeed to some slight extent hinder rather than favor bacterial activity. An injury of this character, however, is usually of a temporary character, since in due time through air slaking further injury is obviated and the alkalinity of the soil is reduced. Stress is laid upon this matter since most farmers in Vermont, who have of late

years practised liming, make the mistake of considering it, as for generations they have been considering the usage of other forms of fertilizers, as a material to be sown in the spring. Fall sowing is practised almost universally in those sections where liming is an old practise and is very much to be preferred here.

Lime should never be used in connection with an ammonia salt, with organic nitrogen, or with soluble phosphoric acid. It is a common thing for farmers to mix wood ashes with hen manure. This makes the hen manure more drillable, but drives off much costly nitrogen. It is a mistake likewise to mix lime or ashes with a commercial fertilizer containing soluble phosphoric acid, as it tends to make this material again insoluble and to undo the work of the manufacturer.

How often should one lime and how much should be used? Circumstances govern. One certainly should not lime in consecutive years and ordinarily it is not applied more than once in from four to eight years. For the correction of acidity or to improve the mechanical condition of a soil, a single application suffices for several years, and then, later, light dressings may be applied at considerable intervals to preserve the texture and the alkalinity.

However, it should be said that practise varies according to the kind of soil, the amounts used, the form of lime, the length of rotation and the crops which are grown. Speaking broadly, from one to two tons used once in from five to seven years are apt to meet most cases; the larger amounts to be used on the heavier and the smaller on the lighter soils.

Form in which to use lime. Quicklime is usually the cheapest available lime. It is, however, much the most disagreeable to handle. It does anything that any other form of lime can do, save land plaster, which can be used in the stable to hold ammonia, whereas quicklime drives off ammonia. When slaked lime, lime kiln ashes, marl or impalpably ground carbonate of lime may be purchased at fair prices these may be preferable. The slaked lime and the lime kiln ashes are not as powerful as is the quicklime, nor is the marl or carbonate as powerful as the slaked lime. However, one can buy for a dollar more slaked lime, marl, or finely ground carbonate, than of quicklime. It may frequently occur that one dollar spent for one of the milder forms may produce in the long run quite as serviceable results as a similar sum spent for agricultural lime as such. Moreover, the milder forms are much more readily spread and are handled with less difficulty. If one desires to sweeten a soil any form may be used other than gypsum or land plaster. If one particularly wishes to free plant food in any soil, or if one wishes to furnish lime which is thought to be deficient in the soil, any form may be used; if one wishes to fix ammonia in the stable or in fermenting manure, gypsum or land plaster only should be used, as the other forms drive off ammonia.

Manner of application. In sections where liming is a com-

mon practise it is customary to plow the soil, to spread the lime upon the surface somewhat evenly, using a lime spreader, and then to harrow it in. If, however, the sod is very heavy, sometimes half is put upon the sod and plowed under and the other half put on as a top dressing and harrowed in. The manner of application naturally varies somewhat with the conditions and the form of lime used. Where animal husbandry obtains and soil acidity is not a factor, land plaster is frequently the best form in which to apply lime, using it by way of the stables. The following suggestions from Bulletin 99 may be of service:

"*How*. The manner of application will naturally vary somewhat with the object sought and the form used. Where animal husbandry obtains and liming is desired, land plaster is often the best form to use, by way of the stables. In cases of direct application, however, the lime may be either spread on the surface and turned under, sown on the furrow, and harrowed or disked in; spread from small heaps checker-boarded over the field, or from a grain drill with a fertilizer attachment, or from a lime spreader. The first of these procedures is not as common and, perhaps, less advisable than the second. Whatever system is used and whatever form of lime is applied, effort should be made to have the particles as fine as possible and to mix them thoroughly with the soil. When quicklime is used it is well to slake it shortly before using. A good way to do this is to sprinkle a couple of pails of water to the cask over the pile or piles and sand, then to cover them over with soil. The lime will thus slake evenly and crumble to a powder in a few days. If the lime is to be spread from these heaps, and it is desired to use a ton to the acre, make twenty-pound heaps twenty feet apart each way, covering each with moist earth or with dry earth after moistening each pile, or with about a quarter of a pail of water for slaking. Spread evenly. Lumps may be screened or picked out. The lime should be harrowed in promptly after it is spread lest it cake with the soil forming a sort of mortar. Protect eyes, nose and mouth from lime dust.

"Before this subject is closed attention should be drawn once more to the fact that the various forms of lime are really stimulants rather than foods. They may occasionally furnish needed plant food, but their main service is of another nature. Their continued use is fraught with danger if not disaster. Nitrogen, phosphoric acid and potash, the very essence of farm real estate, are forced by their use from the soil and into plant growth. If this latter is sold from the farm, and lime alone added to the soil, it will only be a matter of time when these, or some of these essential plant food constituents become so reduced in quantity that profitable crop production can no longer be expected. This is why "lime makes rich fathers and poor sons," and also the reason for the well-known fact that land plaster does not produce the crops it used to on many soils. So long as enough nitrogen, phosphoric

acid and potash, capable of being made available through the use of indirect fertilizers, were thus withdrawn from the soil, all went well; but when these failed, everything failed. The moral of this is obviously to use such materials with intelligence, with a full knowledge of their faults as well as of their virtues."

VERMONT'S CHIEF AGRICULTURAL NEED.

MASON S. STONE, SUPERINTENDENT OF EDUCATION.

Nature has decreed Vermont to be a state of husbandries. The old glacial period made its deposit here and fitted the state especially for agricultural pursuits. It is time that we began to appreciate our inheritance and to take possession of it. To appreciate our latent wealth, to enter into possession, requires education. To provide that education is the duty of the state. But how can the state do it? Not wholly through the high schools, although they will greatly contribute. The high school of Vermont is a public school. It should be an institution of general instruction and not of special instruction for a special class of people. Heretofore we have been giving class instruction, and preparing a few who wished to go to college.

The high school cannot and should not be an institution for making farmers, as such. But because the rural high schools are supported in large measure by agriculture, they should in turn do something toward agriculture. We have been making the boy fit the school and have not fitted the school to the boy. The high school principals are more eager today than ever before to fit the school to the boy. We have some principals that have done something along the subject of agriculture. At Rochester, the principal did not feel that the school was as profitable to the boys as it might be, and he was the first man in the state of Vermont to introduce the Babcock tester. It is a suitable appliance to put in every rural high school. Agriculture has just as much culture value in it as ancient history, and it is just as profitable to teach boys to pull beet roots by hand as it is to pull Greek roots by tongue.

The elementary schools cannot produce skilled farmers—the curriculum is too crowded, the pupils too young, the teachers too unskilled. But the elementary schools can prepare the way. We ought to have a school for practical instruction, where there are tools, barns, cattle, lands and opportunities for the boy to come into direct and practical contact with farm conditions and

material. If a boy can have an opportunity to go to a farm school where he can learn the manipulation and fertilization of soils, learn about the feeding and breeding of cattle, learn about caring for and marketing crops, and have an opportunity to discover himself and the possibilities in Vermont agriculture, then something for him will be done.

The trade school helps the boy to help himself. An agricultural high school is an institution, not simply for the boy, but for the state. If we could have an agricultural high school where our boys could go, and from which each year there would be sent back to the farms one relay after another, what would be the result? Would not the dairy product double? The grass crop double? The potato crop double? The corn crop double? Would not the wealth and productivity in agriculture in Vermont double? Yes, it can be done. Vermont's chief need is, and its greatest agricultural asset would be, an agricultural high school. The state cannot afford to go longer without it.

THE CONTROL OF NITROGEN WASTAGE.

JOSEPH L. HILLS, DEAN OF THE DEPARTMENT OF AGRICULTURE, UNIVERSITY OF VERMONT.

Bulletin No. 130 of the Vermont Experiment Station, now almost out of print, is given over largely to the consideration of soil biology and its relation to fertilization. It is pointed out in this bulletin that there are great losses of combined nitrogen due not only by nature's prodigality, but likewise to man's wastefulness. It is likewise pointed out that there are several means whereby this wastage may be in part controlled and in part or quite made good by accretions of nitrogen. Although this bulletin was issued only three years ago, and doubtless is still in the hands of many Vermont farmers, I risk repeating what I wrote therein and write a few words touching the control of nitrogen wastage.

Nitrogen Losses. There are many ways in which nitrogen is lost.

Decomposition and *denitrification* set free much nitrogen from the combinations into which it has been welded by plant or animal growth. Millions of tons thus pass off into the air yearly.

Drainage waters contain large amounts. Nitrification, which renders available to plant purposes the nitrogen in manure, organic matter, animal and plant residues in general, makes immense

amounts soluble. Much of course is absorbed by plant life; much, particularly in the fall and in seasons of heavy rains, passes to the subsoil and into the drainage waters. The annual nitrogen wastage in the rivers of the world is almost beyond compute. For example, the Nile discharges into the sea over twenty millions of dollars yearly.

The *explosives* used in warfare, hunting, Fourth of July celebrations and the like, are made from materials which contain nitrogen. They owe their effectiveness to the instantaneous manufacture of nitrogen gas from a solid material when exploded.

Crop removal is another potent source of loss. Every crop that is sold from the farm carries with it more or less nitrogen. It may be little as in butter, or much as in hay. While frequently this means simply the removal of the nitrogen from one locality to another, in view of the fact that manure is frequently ill cared for, and that city wastes are almost invariably lost to fertilization, much, indeed most, of it is lost.

The present methods of *sewage disposal,* while admirably adapted to favor sanitation, are ill adapted to the preservation of manurial constituents. Time was when this was thought to be a most serious condition and was viewed with great alarm by political economists. Today, with our more ample supplies of plant food from Germany and from South America, the southern states, the packing houses and other industries, not to speak of the new draughts from the air by way of lime nitrate and calcium cyanamid, we are less concerned than formerly at losses of this character and we may well permit sanitary considerations to take precedence.

Fallowing is a practice employed in some sections; the leaving of the land bare, unoccupied by a crop and subject to serious losses through nitrification and loss by leaching of a larger part of the nitrate thus formed. Fallowing is a penny wise, pound foolish system which wastes largely for the purpose of rendering a modicum of plant food more available.

Ill advised rotations are serious sources of nitrogen loss. As has just been remarked, an unoccupied soil loses nitrogen, while an occupied soil is less likely to lose it. The losses in the fall (and in the winter under circumstances where the ground neither freezes nor is snow covered) are due to lessened evaporation, lessened leaf transpiration, lessened capillarity, increased percolation, the accumulation of nitrates in the late summer and fall and to autumnal rainfall. A rotation system which includes a catch crop for the fall covering of the soil, lessens percolation, increases evaporation, re-establishes transpiration, catches nitrates, increases the manurial as well as the food resources of the farm, and is frequently well worth the time, expense and effort, even though the crop itself is plowed under. A catch crop, however, it is fair to say, is more necessary in latitudes south of Vermont than it is here.

Inadequate care of manure is another serious source of loss. Leaching and fermentation cause nitrogen to pass downward to the soil, and upward into the air. The preventable wastage from the manure piles in the State of Vermont unquestionably amounts to millions of dollars yearly, a wastage which is largely within the control of the farmer.

The methods of control of these divers forms of wastage naturally vary. As intimated in the beginning of this article, one may either lessen waste, increase income, or both.

The Lessening of Waste. One may lessen the fermentation of manure by the liberal use of some form of preservative or fixative such as gypsum (land plaster), acid phosphate, kainit or, possibly, floats. Gypsum (land plaster) is the standard material used for this purpose. It contributes no direct plant food, but as an indirect fertilizer is usually worth what it costs, applied either directly to the soil or indirectly by way of the manure pile. Acid phosphate and kainit are probably less serviceable with neat cattle, for the reason that they are apt to cause sore feet. These, however, have the advantage of furnishing deficient forms of plant food. Floats have come very much into the public notice of late. They are simply an extremely finely ground phosphate rock. The acids of the manure tend to render its phosphoric acid somewhat more available and thus to make the manure a more all-round fertilizer. Experimental trials seem to indicate that floats have a distinct power to lessen fermentation.

Drainage losses are best controlled, as already mentioned, by such constant occupation of the soil as will tend to lessen the downward escape of the nitrogen. Some losses of this character are inevitable. The lessening of wastage by the use of explosives can only be accomplished by the hastening of that day when the swords shall be beaten into pruning hooks, by the extention of the work of the Hague Tribunal, and by the furtherance of the movement towards a safe and sane Fourth of July, etc. The wastage through crop removal is difficult to control. Of course plant food is serviceable primarily for the growth of crops, and crops are not grown simply and solely to turn back into the soil but to be removed and used for man's purposes. Occasionally it is good economy to sell a crop like hay, or live stock, or milk, even though one knows at the time that he is selling a large amount of plant food. It is economy if the sales price is sufficient, and if in the growing of that crop there has been brought upon the farm directly or indirectly, through purchase of feed or the use of legumes, etc., amounts of plant food which will make good or more than make good their draught. One should, however, in determining the type of farming he is to pursue, bear carefully in mind the fact that crops vary in their plant food contents and see to it that the price obtained for the crop is large enough to warrant the removal of the plant food from the farm.

So far as fallowing is concerned, Punch's advice to those

who contemplate marriage, holds. "Don't." It is not a system which obtains to any large extent in the East and needs no further consideration at this point.

The control of nitrogen wastage by the direct increment of the soil nitrogen content is well worth considering. Time was when men, particularly those who were the most far seeing, were fearful as to the ultimate destiny of the human race. It was freely predicted that mankind was to starve to death through lack of or wastage of combined nitrogen. However, both biologically and chemically, we now catch the nitrogen from the air. The vast amounts which pass over every farm in every breeze, are no longer safe from arrest. The clover and alfalfa, the beans and peas, legumes of all sorts have means whereby they can gather and store within their tissues this aerial nitrogen. As it is now known to almost every farm boy, the nodules or bunches upon the roots of these plants are houses in which live countless myriads of bacteria, which in their particular co-partnership of the host plant (the clovers or legumes) are enabled in some mysterious way to acquire this nitrogen for the purpose of feeding the major plant. And then the crop, used for feeding purposes or turned under as a green manure, furnishes the nitrogen for other crops like the cereals, corn, potatoes, etc., thus nourishing all kinds of vegetable and animal life.

Then, too, there is another form of bacteria in the soil only recently discovered, less thoroughly understood, which is apparently able to gather nitrogen from the air without connection with the larger leguminous plants. This is doubtless a most important matter as all forms of plant life can profit thereby.

Within a decade man has chemically gained the mastery of the air as he has mechanically by way of the aeroplane. There are now great electrical plants in Norway, Italy, at Niagara Falls, and elsewhere, which fix nitrogen from the air either as nitrate of lime or as calcium cyanamid, both of which are nitrogen containing bodies. The amounts thus far obtained have not been great enough to cut any very large figure in the fertilizer trade, but it is already evident that in the not distant future these will be large factors, and that one may waste even more prodigally than he has in the past without feeling that he has done the race an irreparable wrong.

However, it is for each individual farmer upon his own farm to look upon the matter not in the broad but in the narrow way, and to maintain and increase rather than to decrease the plant food content of his soil. His best practice for the saving of that which he has in the way of soil nitrogen is to keep the soil occupied, to lessen manurial decomposition by use of absorbents and fixatives, by its quick removal to the fields, by the keeping of the soil occupied to lessen drainage losses. He may increase the store of nitrogen of the soil by growing legumes freely, by rendering his soil alkaline so as to promote the bacterial growth, and by the

purchase when he goes to market for grain feeds, of those by-products which are relatively rich in protein and consequently in nitrogen. A man who thus farms is likely to hand down to those who succeed him, acres which are richer rather than poorer than when he received them.

THE HOME VEGETABLE GARDEN.

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UNIVERSITY OF VERMONT.

The farmer's garden might well be made an important source of pleasure and profit, but it is not apt to be thus used. The vegetable garden usually falls far short of expectations, and when one surveys the general situation in Vermont, it is easy to attribute failure to one or many causes. It is the purpose of this paper to enumerate the usual difficulties to successful and profitable vegetable gardening, and to suggest ways of overcoming them.

Even a brief survey will enable one to enumerate several points which need consideration. Among the more important are:

1. Improper location.
2. Excessive hard work and the practical elimination of team work.
3. Scant fertility of garden soil.
4. Unwise selection of varieties.

The quality and value of a vegetable depend primarily upon the conditions under which it is raised. When properly grown, vegetables are succulent, juicy, and crisp. These characteristics are of paramount importance and cannot be obtained until the somewhat exacting requirements of vegetable culture are fulfilled. These conditions lead one to consider a number of points, and to refer to certain preliminary requirements which will now be briefly described:

The location of the garden is important. It should be near the house so as to be easy of access. Proximity to farm buildings and in a place convenient for farm help, will tend to insure the constant care which is necessary. The land should slope to the south if possible. A southern exposure is warmer all the year, and has the advantage of earliness. Fully half the pleasure, and much of the profit, comes by virtue of having vegetables in good season. One takes an honest pride in producing good vegetables a little in advance of the season.

A good garden soil is imperative. The best spot on the farm should be selected, provided the other essential requirements are compatible with such selection. The soil should be well drained, quick and responsive to the advancing season, and in good tilth. A sandy loam, or any soil carrying considerable quantities of sand and humus, is to be preferred.

Suitable preparation of the land is important. Many vegetables develop long roots; hence the necessity of deep ploughing. Good root crops cannot be secured unless the soil is open and porous far below the surface. Deep ploughing is also needed to maintain good physical condition, to augment the chemical activities of the soil, and to conserve the moisture. Sub-soiling may be advisable if the land is hard or very compact.

Fertilizers must be applied in abundance. Good quality in vegetables is possible only under conditions which produce rapid growth. Well-rotted barn manure is to be preferred, using several tons to the acre, ploughed under. In addition to manure, an application of high-grade commercial fertilizer, in quantities of 1,000 or more pounds to the acre, is advised. Good vegetable gardeners near the large cities intend to apply an excess of fertilizing materials, having learned through experience that vegetables must be liberally supplied with available plant food.

A plan of the garden is a great help. It provides for each vegetable in season and in suitable quantities; it avoids oversight and, if well worked out, it aids materially in keeping the land busy. Provision for team work is highly advantageous for long rows and room for turning, for rows so far apart as to allow for horse cultivation. All this promotes ease and economy in cultivation.

Novelties should be avoided in the economic garden. Untried varieties may be planted for experiment, but no one should depend on the unknown. It is far better to hold to the tried and standard kinds, and to use only those which are known to be good and to be adapted to our soil and climate.

Irrigation is often necessary. Vermont gardens are not immune to dry weather. On one place in the trucking sections near Boston, three men do nothing but water plants. I saw two or three men standing there, supporting their arms and holding a hose. I asked one of them, "How long do you water?" He said, "I have been here for three weeks." And to the query, "Is your job permanent?" he replied, "Just as long as my arm holds out." The great market gardeners are looking out for their water supply. They give their vegetables a chance and both owner and crop profit thereby. They buy the water at meter rates and sell it in the shape of vegetable growth at a relatively high cost.

In controlling insects and diseases, sanitary management is a most efficacious measure. To this end one should clean up and destroy wastes from the early crops and, later, burn all refuse after harvest in the fall. For insects which work above ground two general types of sprays may be applied; first, stomach poisons

like paris green and arsenate of lead for all insects which eat or chew the stems or leaves; second, contact poisons like soap emulsions.

The fundamental concepts in vegetable gardening are:

1. To afford a sufficient supply for family use throughout the growing season, and, if possible, during the winter.

2. To grow a continuous succession of plants. Many of our plants like lettuce and radishes are in good condition for a short time only. One may have lettuce and radishes all summer by repeated planting which enables continued harvests.

3. To plan in such a fashion as will ensure ease and cheapness in planting and cultivating.

4. To maintain the productivity of the soil.

Careful statistics made by government experts show that a well-kept garden yields ten to fifteen times as much as does average farm land. The statement is made that a half acre devoted to various garden crops will supply $100 worth of vegetables in a year, while the average return for farm crops is from $8 to $10.

I once knew a man who had a dream about a vegetable garden. His dream took the form of a resolution, and his resolution became active. The next year his dream came true.

PROPAGATION OF HOUSE AND DOORYARD PLANTS.

STANLEY HARGREAVES, GARDENER, VERMONT EXPERIMENT STATION.

The farmer who wishes to enhance the value of his farm strives to make it produce its utmost in marketable products; yet he who measures the outcome merely by the yearly cash returns forgets to figure on whether his farm is being depreciated in fertility in order to secure these returns, or whether each year it is being made more valuable through adequate tillage, well-planned rotations, the securance of extraneous plant food and the procural of new farm equipment. An intelligent farmer does not rob his land of dollars in order to swell his bank account; but rather gives other dollars back in the form of improvements of various kinds. Vermont farmers must now farm with an eye to the future, and not, as in the past, with the view of squeezing the life blood from the land, meaning later to move West; for he who goes West today does not get good land "dirt cheap," as formerly.

As a general rule the New England farmer has not thus far looked upon the planting of trees, shrubs, and flowering plants as

an improvement to his farm. Why should not a farmer decorate his farm just as the merchant trims his show windows to attract customers; or as a city lays out a park to make itself more attractive to people looking for a desirable place of residence? The beautifying of a farm should be considered one of its most valuable improvements; not that of necessity it will yield more dollars each year, but because it will be worth more dollars each year to live in pleasant surroundings. Again, a prospective buyer may thus be induced to offer a larger price for an attractive-looking place.

Each may do his part in making New England a more pleasant place to live in. It already has a natural beauty of its own, which has been despoiled by man to a considerable extent. This destruction must now be stayed and we should work with, rather than against, nature to make our community more attractive. To this end it were well to begin right at our own dooryard, and as we gradually train ourselves in a taste for the æsthetic side of country life we may widen the sphere of development according to our tastes. The actual cost will be but slight, for a dollar's worth of seed sown in the right place gives returns in future years, to ourselves and to others, far out of proportion to the capital invested. Therefore, let no farmer permit so small an expense to stand in the way of his full enjoyment of country life.

Let the farm be made attractive to the children, thus giving them a lasting desire to stay in the country. Let the place display a smiling countenance in the presence of visitors, who will judge your character and qualities by the artistic tendencies exhibited around your house. The way-faring man or the automobilist will not pass without at least a casual glance in your direction; and the human feeling within you will be abashed if you are classed as a shiftless rustic. If you are a successful farmer, and wish your community to think well of you, you must not only have a well-kept house internally, but the exterior must also be attractive. Every tasteful attempt to adorn a farm house and buildings exerts a valuable influence upon the community, and it furnishes an object lesson which others may follow. To him who is the leader in such a cause, is honor due.

A taste for gardening may be acquired by beginning to learn the first principles in the propagation of plants, that is to say, the reproduction of plants either by cuttings or seeds. If we take a cutting or slip from a plant and get it to form roots and to start into growth, a perfect form or likeness of its parent has been generated. Such a result does not always occur when planting seeds. On the contrary all the new plants are not apt to be exactly like the plant from which they were taken; a tendency towards variation is found, as for example in the color of bloom. This fact exhibits the difference between heredity and variation. The working of heredity is shown in the production of an offspring in the likeness of its parent, and of variation in the pro-

duction of one of a somewhat changed character and form, the results of a sexual cross between two individual parents.

If we wish to propagate chrysanthemums, carnations, roses, coleus, heliotrope or geraniums, and to perpetuate their desirable qualities, we must resort to the artificial process of making cuttings or slips. The idea is prevalent that a cutting must always be made directly at or below a joint. This is not necessary with the plants in question. In the case of a geranium cutting, for instance, the place of detachment is decided by the condition of the wood, i. e., it must snap off short when doubled up by the fingers, and must not be soft and flexible. If the plant is in a healthy condition, free from disease and insects, snappy young wood will be found some two or three inches below the growing point of the branch, where the detachment must be made. The base of the cutting will then be trimmed off smooth with a sharp knife, as well as the lower leaves, and placed in sand or sandy loam which should be pressed very firmly around the cutting.

The propagation box, bench, or what not, should have a hole in the bottom through which to let out surface water, else trouble with "rotting off" will ensue. It must be kept in a temperature of about 55 degrees F. or so, and if placed where 10 degrees F. extra heat from the bottom may be obtained, so much the better. If the night temperature of the house is too low through the winter, the spring or fall of the year should be chosen for the propagation of cuttings. In no case should the cutting be allowed to wilt; if there is danger of this a little sprinkling with water will help it to recover. If a rather moist atmosphere around the cutting can be given, so much the better. A large fruit jar or other glass receptacle placed over it retains much moisture. Moreover the direct rays of the sun must be broken by shading with white paper or thin cotton cloth.

Indoor gardening is greatly enriched by the culture of a few bulbs. A profusion of bloom and fragrance may be had for but little labor and attention when everything outdoors is enveloped in frost and snow. As in all garden work, foresight will be necessary in order to bring success. The bulbs should be bought in September or October and when received should be planted at once in the boxes or pots in which they are to grow. A considerable variety of bulbs can be grown successfully in the house, including the hyacinth, tulip and narcissus. They are also the easiest of plants to grow if the precaution is taken to have the roots well formed before bringing them into the house to force. The prices have a rather wide range, but a large number are quite within the reach of every one.

Soil for potting should be rich and light, a compost of decayed turf, old, rotted cow manure, with an addition of sand, and, if procurable, a little leaf mould. The boxes may be placed on level ground, covered with two inches of soil, and then with leaves six inches to one foot deep; more being added as winter advances.

Roots form in from six to ten weeks, though longer periods are needed for hyacinths. The temperature should be cool at first, they should be exposed to the sun while growing, and shaded while blooming.

Outdoor bulbs. Hyacinths, tulips and narcissus for blooming outdoors in the spring should be planted in October, after the summer bedding plants have been cleaned off. Here they will need to be planted much deeper, this being governed by the size of the bulb, the very large narcissi ranging from six to seven inches, the hyacinth about six inches, the tulip and smaller narcissi and jonquil five inches, while crocuses may go three inches deep. The ground should be prepared by digging in some well-rotted manure to the depth of a foot, and then be raked off smooth. A fork handle would do very well for making holes in which to place the bulbs. After putting them in, the holes should be filled with loose soil and the bed covered with leaves, which must be taken off early in the spring. The south side of the house should be chosen in order to get them early. When the blooming period is over, other annuals may be planted over them, and, if not disturbed, the bulbs will bloom again next year, but after two or three years they should be taken up and divided. All early spring flowering bulbs may be dug up directly after the tops are dead, and stored until fall in a dry place under a shed.

Late March or early April is the time to get ready for summer bedding, and the sowing of the seed of garden annuals. A few stock plants will have been kept over from the previous year's bed, including geraniums, salvia, coleus, iris, fancy grasses and the tubers of cannas and caladiums. It is not absolutely necessary, however, to keep stock plants over winter, but perhaps more desirable than growing them from seed each year. The geranium will be lifted before fall frost, and potted in any good garden soil. When taking them up, the roots as well as the tops may be pruned back rather severely. If placed in six-inch pots with some bottom drainage,they will soon send out new roots, and, if kept in the south window, new branches will be formed during the winter, from which healthy cuttings may be obtained. It is advised to take a good supply of cuttings in the fall before frost. The salvias, coleus, and irises may also be potted with the object of taking cuttings from them in the early spring. Cannas and caladiums have tuberous roots and, when their tops have died down, these may be taken up and treated much as you would treat a potato. They are multiplied by cutting them up into pieces, leaving a growing tip on each piece. In starting the cannas they should be packed closely together with the tips upwards in a flat box, using moss or very loose soil as a medium to hold moisture. When the tops and roots have started they are ready to be potted. The fancy grasses used in foliage beds may all be started from seed. They may be taken up in the fall with the rest and stored in moist soil and sand in the cellar. In the early spring the

clumps are divided, potted up and started into growth. The foliage bed will not be complete without the castor bean to fill out the center. This valuable plant may be easily started from seed during the early spring months. It gives a tropical effect in connection with the regular bedding and no lawn should be without it.

ORCHARD RENOVATION.

M. B. CUMMINGS, PROFESSOR OF HORTICULTURE, UNIVERSITY OF VERMONT.

The outlook for apple culture in Vermont is very promising for several reasons:

1. We have a soil well adapted to apple orcharding;
2. We have an exceedingly good apple climate;
3. We are in immediate proximity to almost unlimited markets. Though but a few miles from Boston and New York, these cities, at the present time, have to depend almost entirely on Pacific Coast fruit;
4. We have numerous unproductive orchards with wonderful potentialities;
5. We produce but a scant supply for home use and export only a small output. Apples were never so high priced as today. They are becoming more and more to be a staple product. The price has been advancing yearly, and I am wondering whether we will long be able to buy apples.

A revival of interest in fruit culture is occurring. The New England fruit show gave this movement a great impetus. Large plantings are being made all over the state. Numbers of inquiries and notes have come to me in regard to large plantings now being made or to be made next year if nursery stock is available. A great many inquiries are made as to where nursery stock may be bought and I have had to refer them to points beyond Eastern New York and in the Middle West, since the stock in the New England nurseries and in many of those in New York State is already exhausted. This indicates a widespread planting. This is good, commendable. But those who are planting apple orchards today must wait eight to ten years for the harvest. Whence will come the apples of tomorrow? If the West keeps our market for ten years more she is likely to keep it for a much longer time. Moreover we need apples for our own homes. Our real problem then is not so much that of planting new trees as it is of renovat-

ing the older ones, the renewal of the large number of unproductive and neglected orchards to be seen everywhere.

What kinds of orchards are worth renovating? One in which 60 percent or more of the original stand exists, would probably be worthy of renewal provided:

The tree trunks are sound and the main branches are free of disease, with few cavities, rotten places, or weaknesses in the general framework of the tree.

The tops are not badly broken down either by ordinary agencies or through careless pruning.

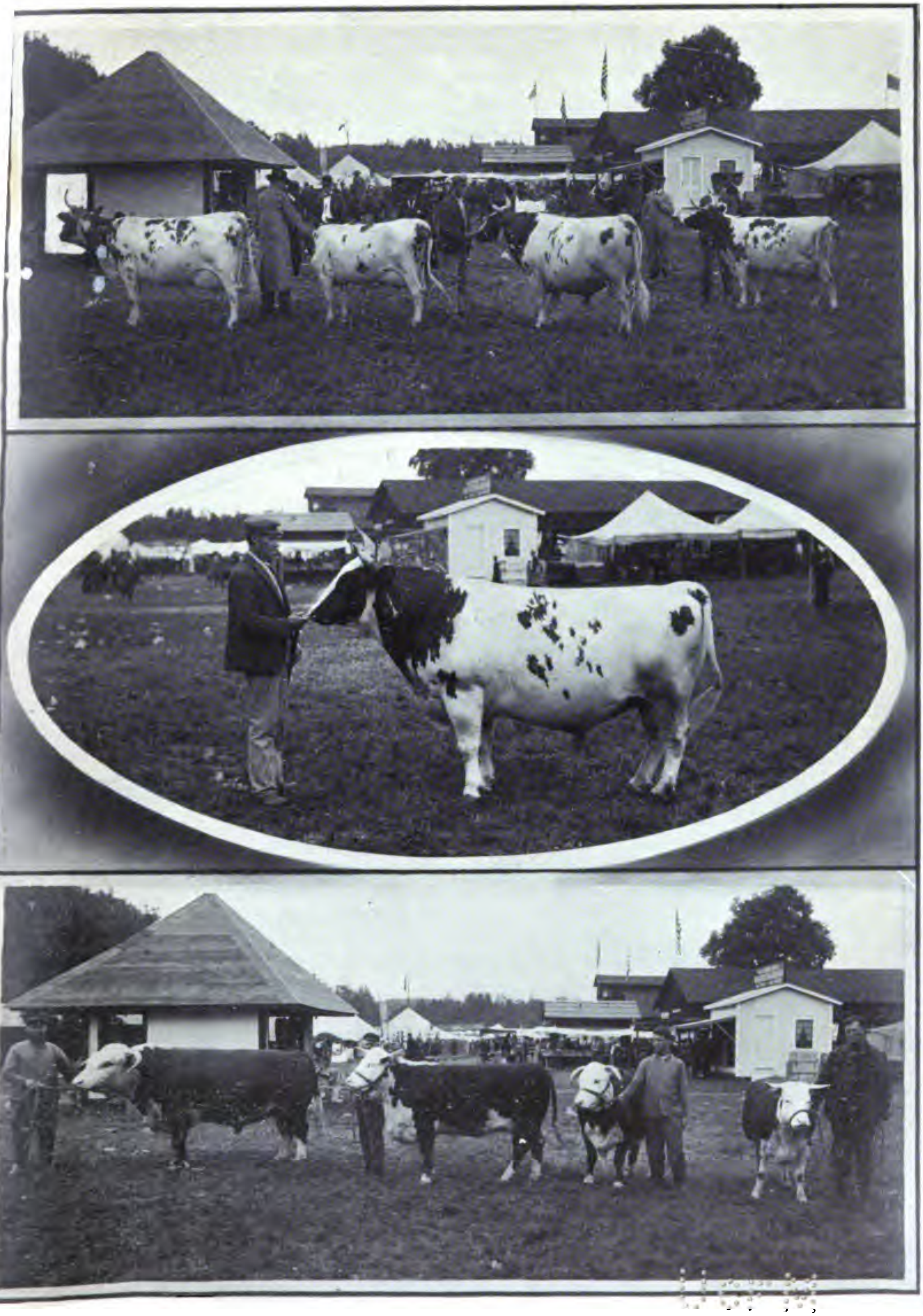
The land is tillable; for to renovate an orchard on soil so stony, ledgy, or steep as practically to prohibit tillage operations were unwise, since it would make not only tillage but spraying and harvesting operations difficult.

If such conditions prevail we may well consider the advisability of attempting the best possible renovation operations.

There are two general types of orchard renovation. The first of these relates to the renovation of the soil, tillage and fertilization; the second to a renewal of the trees, pruning, spraying, and top working—if necessary. Let us consider these briefly.

Experience and observation teach us that tillage is necessary if we are to secure anything like fair returns. Apples can be grown on sod land, for an apple tree will grow and bear even though neglected. No fruit tree stands more abuse than does an apple tree, and none responds more quickly to good soil and drainage conditions.

The soil must be fertilized, must carry an abundance of plant food. Without it the tree suffers and the fruit is inferior. How much fertilizer to use depends upon how much has been applied previously, and what the land has been used for. For instance, old orchard land in grass, and treated as ordinary hay land, should be ploughed and loosened up. Manure, if available. should be ploughed in or a cover crop sown, preferably clover, If the land has been ploughed occasionally, and fertilized somewhat or top dressed, perhaps manure need not be applied for a few years. Moderate applications are preferred because too liberal ones invigorate the trees beyond safe limits. There is danger of overdoing renovation operations. It is unwise to disturb the trees too much unless they are not bearing. Disturb them from the branches to the bottom of the roots if necessary, but do so with discretion. Some apple trees have the habit of bearing every year, others only bear on alternate years; and some years bear hardly at all. One can change these habits somewhat by modifying soil conditions, by pruning, by spraying; but if too much is done at once, the fruiting habits are interfered with. So be moderate; do not do everything at once. If you fertilize, graft, prune and till old trees, the chances are that they will bear wood and acquire that habit, and then it is not easy to get them to settle down to fruit production.



Glimpse of the Show Ring, State Fair, 1909.

It is well to have a plan in orchard management and to follow it carefully. The scheme given below is worth while.

SIX YEARS' PLAN FOR AN APPLE ORCHARD.

First year. Cultivation. Manure (6-8 tons). Buckwheat and vetch.

Second year. Cultivation and commercial fertilizer, plus buckwheat.

Third year. Cultivation and manure, plus vetch.

Fourth year. Cultivation plus commercial fertilizer, plus mammoth clover.

Fifth year. Mammoth clover, plus manure.

Sixth year. Cultivation plus commercial fertilizer, plus buckwheat.

Assuming that we have an old orchard to be renovated, I should recommend ploughing the first year and the practice of cultivation, applying manure—if it is available—at rate of six or eight tons to the acre. Tillage operations should cease about the middle of July and cover crops be sown, using either buckwheat or vetch. If manure is not at hand, I lay special stress on the value of certain cover crops; but if an abundance of manure may be had, the cover crop may be omitted the first year. The second year I should cultivate and plow under a commercial fertilizer in the spring, as soon as the land is tillable, stopping tillage operations in mid-July and cover cropping again, sowing the seed lightly, but growing just enough crops to take up the moisture and to furnish a little humus. The third year I would cultivate again, manure the soil and use vetch as a cover-crop. The fourth year I would cultivate once again, use a little commercial fertilizer, and stock down with mammoth clover. This will change the soil conditions somewhat. I would not till every season without an interim of sod, but would let this mammoth clover stay on and perhaps add a little manure as a top dressing the fifth year. With the sixth year I would begin cultivation again.

Cereals should not be used as a cover crop if any other crop can be employed. All cover crops should be sown about the middle of July, which will allow ample time for a good growth before winter. Cultivation should cease about the same time in order that the trees may harden up and get ready for winter. If we cultivate too late, or over-fertilize with nitrogen, we encourage late wood growth and, as a consequence, winter killing of the buds or fruit spurs. Raw ground bone and muriate of potash, half and half, used three or four hundred pounds to the acre, is a good commercial fertilizer for old orchards. This supplements the highly nitrogenous manure and better nourishes the tree. Lime may be applied at the rate of four hundred pounds to the acre if the soil is acid, but not otherwise.

Now as to the renewal of the trees, we have three distinct things to consider: pruning, spraying and, if we have undesirable varieties, top working. Let us consider each of these briefly:

Pruning is imperative. The tops should be kept open; the heads, so far as possible, low; and the whole branch system spread out. We want room for ventilation and sunlight, the branches clear down to the trunk healthy and vigorous, and a constant annual renewal of wood to produce fruit spurs. All kinds of pruning are extant in Vermont and often the trees have never been pruned. It has been said that in renovating orchards one should prune up, clean up, and scrape up. On the contrary, one should prune down, clean down and scrape down. Airships are not practicable for picking fruit. For several reasons the trees should be kept low that they may be readily reached in spraying pruning and grafting. The low-headed tree is the modern ideal, the universal Western form. We want skyscrapers only in the city. To renovate a tree with a bushy top, one should begin at the top and lower the head. This will tend to throw the energy of the plant further down and will re-invigorate the lower branches, which may be cut back the next year. Then in about three years one can get the low top which is now in vogue. An apple tree is one of the most elastic and responsive things in the world, if one knows how to manage it. The branches should be headed back so they will be strong enough to support the fruit, for apples are nearly all borne at the ends of the branches. A fruiting branch which is good at the terminus is of little value if there is a rotten place farther down. Strong, healthy and sound trunk and branches should be sought. The best time for pruning is in March or April, before the tree begins its spring growth.

Grafting. Fewer varieties and better ones is the current conception of orcharding in the great Northwestern apple orchards, where growers plant only three or four varieties; but in Vermont we have many orchard museums. I found in one county some years ago over one hundred varieties of apples. Now if we have in our orchards, as most of us do have, a lot of these old-fashioned varieties, let us get rid of them by top working. Our grandfathers planted the trees, but their choices are not of necessity those the market now demands. Top working should be done with caution. If a very large tree were worked, I should go right into the top, cut off some of the vigorous branches and place cions of the desired variety in them. Care should be exercised in the selection of cions because of the great differences in the bearing habits of our trees. They vary greatly both as to quality and quantity of fruit. Some Baldwins bear uniformly small apples, and some, large ones. Some Baldwins bear heavily, and some, lightly. The very best tree one has, the one which produces the best apples of good quality and size, a tree of high productivity, should be sought for cuttings for top grafting. This operation should be done just before the trees start growth

in the spring, but it is well to take your cions in the fall before the snow comes. They may be cut from wood of the current year's growth, tied in bundles and stored in the cellar or some cool place. Care should be exercised to use one-year-old twigs and to discard butts and tips, using only the central portion.

Placing the cions. The cions should be inserted so that the green bark on the sides of the cion shall correspond with the inner green bark of the stub and they then should be waxed in, in such a manner as to seal everything, because the wound needs protection for several years. Some leave the wound uncovered after the first year and wonder why their grafts fail. This wound should be cared for during the succeeding years. Grafting wax dries, peels off, and must be renewed. We usually put in two cions, because the wound heals quicker if union takes place from two opposite sides, and because sometimes one cion will die. After one year about one-third of the growth is cut back so as to give strength. In top grafting one should work with moderation and not attempt all in one year. The first year the topmost branches may be removed; the next year a few more cions be set, perhaps one-third of the rest of the top. All the old branches should be not dropped off until new ones come in, in order to protect the cions from sun burn, and to enlarge the leaf area. Cut back only a little each year. If you dehorn a tree as you do a cow you are apt completely to annihilate it. It is often wiser to hire a man who knows the work thoroughly, rather than to undertake it yourself, being but partially informed.

Spraying. The need of spraying is seldom realized; yet is the most important factor in the production of good fruit. Neither tilling, fertilizing, pruning, grafting nor top working, nor all combined, will insure the quality of the fruit. Insects are everywhere in abundance and disease is prevalent; and the general panacea of a good spray alone will avail to keep our trees healthy, and to insure a good quality of fruit. No one spray will defeat them all, but a general orchard spray (such as bordeaux for fungous diseases) and an insecticide (preferably arsenate of lead), affords a mixture which is sufficient for most purposes, if properly made, properly applied, and the work is throughly done. Preparations for orchard work should be different from those for potato work or many other crops. A good formula is: three pounds copper sulphate, three pounds stone lime, fifty gallons water, two pounds arsenate of lead. This mixture should be applied just after the blossoms fall or when the majority, perhaps three-fourths or seven-eighths of the blossoms have fallen, and put on as thoroughly as possible. The spray should be thrown right into the young fruit tip at the point where the petals have dropped off, where the insects will get it. Frequently a second application just about ten days after the first is advisable. Two sprayings, generally speaking, are sufficient. I would not

advocate the substitution of lime and sulphur for orchard spraying.

Orchard renovation means improvement all along the line—better tillage, better fertilization, good pruning, careful spraying, the adoption of a system of orchard management. Orchard renovation is a pleasing and wonderful operation if wisely done. Gradual amelioration tenaciously followed is better than are extreme measures of a transient character.

SELECTIVE PROPAGATION.

M. B. CUMMINGS, PROFESSOR OF HORTICULTURE, UNIVERSITY OF VERMONT.

In the multiplication of species there is always the expectation that the offspring will resemble the parent. The extent to which our expectations come true depends very largely upon the means used to multiply the plant. In view of this statement it becomes necessary to note the two general methods of plant propagation: by seeds, and by the vegetative portions of the parent plant. If seed is used, the general character, only, is likely to reappear in the new forms. Thus petunia will reproduce petunia, even to the point of varietal character; but if we plant Fameuse apple seeds, we may not, and probably will not, secure Fameuse apples. Varietical character in fruit plants will not come true if we use seed; hence the resort to the use of some vegetative portion of the parent plant.

Vegetative portions then assume much importance in horticultural reproduction; and especially so in the case of fruit plants. Each fruit plant usually requires some special methods of propagation: apples are grafted; peaches are budded; new grape vines are secured by cuttings; strawberries by runners. It is not purposed to discuss the means or methods of propagating these various fruits, but rather to introduce a new idea and to emphasize a new requirement in our asexual methods.

1. Plants are very variable. There are hardly two plants in the world which are exactly alike. Some are larger, taller, broader, richer in color, in fragrance or in quality than others of the same kind. And what is even more significant, plants vary much in productivity. Some roses never bloom; some apple trees do not bear fruit; some flowers are not worth looking at; and some fruits are too poor to eat. All this means that the capacity to vary is resident in the body of the plant; that certain characteristics, good or bad, desirable or undesirable are inherent therein.

To perpetuate these characters is to fix the nature and value of the new generation.

2. The parentage of a plant may affect the value of the offspring. We have recently come to believe that a good ancestry is a matter of much importance in plant propagation; notions based in part on good common sense, in part on experimentation. We must select for propagation only such plants as exhibit in the highest degree the desired characteristics.

Let me illustrate: The potato plant has long been the subject of improvement, by fertilizing, tillage, spraying, etc.; but we need also to adopt another good practice—hill selection. For a long time man has tried to increase the yield of the potato by planting large tubers, but without marked results. We thought the tuber was the unit, but our inference was wrong. We now know better. Recently C. W. Wade in Ohio selected tubers from high and low-yielding hills, and secured remarkable results. He took tubers from:

10 high-yielding hills and got a crop of 774 tubers per 100 hills.

10 check hills and got a crop of 607 tubers per 100 hills.

10 low-yielding hills and got a crop of 492 tubers per 100 hills.

The difference between the results attained with the tubers from the high and the low yielding hills was 282 tubers.

This experiment was tried for three years with average results as above stated. This series of trials has established a new idea in potato culture. Similar results were obtained at Cornell. Tubers from hills of Sir Raleigh which, averaging two and one-half pounds per hill, gave a yield of 400 bushels per acre, while other hills averaging only eight ounces gave 80 bushels per acre. These experiments emphasize the importance of hill selection.

Let us take an illustration from strawberries. A man in Michigan advertises pedigree strawberries, or those with good ancestral records. He offers to sell plants which by their performance he knows to be of good quality and of great productivity. The low-yielding plants are discarded, only prolific plants are allowed to form runners, and to perpetuate the variety. The seller claims to conserve the forces of heredity, and to select from desirable variation. He seems to have the right idea.

The history of the Fay currant is also significant. Soon after this variety became known it was much prized and largely sought after. The original plant was of good size and very productive and 12,000 new plants were supplied to 25 buyers. This heavy demand for numerous cuttings entailed carelessness in the selection of parents and in the course of a year or two great variation occurred in the crop. Some plants bore heavily, some lightly, and still others not at all, a result due to bud variation. One cane from the original plant was unproductive, but it was used for propagation; and this one unproductive cane transmitted this infertile character to the new generation. Had the perfor-

mance record of this cane been noted, it would have been discarded.

Our tree fruits vary much in productivity. Some are uniformly productive, others are uniformly unproductive. It is probable that many trees fail to bear because they are propagated from unproductive ones. There is a row of Tolman Sweets, all old enough to bear in our station orchard; but only one tree in the row of thirteen trees has borne fruit. A horticultural friend of mine in Canada says he has high and low-producing trees. Two trees from the lot of nine-year-old Wealthies form a good contrast. One tree bore in five years, on the average, only forty-one gallons of fruit; another, 154 gallons of fruit. Two McMahon Whites gave parallel results, one tree yielded 163 gallons of fruit and the other, tree 502 gallons.*

Some Baldwin apples are habitually small, others habitually large. Some Fameuse apples are uniformly scant in color, others abound in blushes and rosy cheeks. These are characteristics of the individual parent plant. Who wants small Baldwins when he may have large ones, or who desires poorly colored Fameuse when he may have richly colored fruit?

The indiscriminate cutting of cions is too clumsy and inexact in these days when we are trying to introduce scientific methods into our farming. Cions or cuttings tend to reproduce the character of the plant on which they grew. Why select cuttings or cions from unproductive trees? Some hens cannot lay a hatful of eggs; they do not possess the laying ability. Some fruit plants probably cannot be made to bear; they are not the bearing kind.

To recapitulate, I am led to say, that we should know the performance record of plants and for propagation work we should know about their parentage. We may insist that our new generation of plants shall come of good ancestors, taking propagants from bearing plants, and from such individuals as exhibit the characteristics which we desire to have appear in the offspirng.

ORCHARD INSECTS.

M. B. CUMMINGS, PROFESSOR OF HORTICULTURE, UNIVERSITY OF VERMONT.

Insect ravages cause serious annual loss in Vermont. A conservative estimate would approximate one-third the average crop which is thus rendered unsalable. The regular tax of over thirty percent by insects alone is beyond condolence. Some of

*This method of measurement of tree fruit though unusual in this country is not uncommon in Canada.

this loss is unavoidable, but much of it is preventable. The present paper is intended to suggest the means of controlling the most common orchard insects. Very brief statements will therefore be given concerning these pests.

Codling moth. This insect is the cause of much of the wormy fruit in apple orchards. It is the most universally injurious orchard insect of this country, causing an annual loss in the United States estimated at $12,000,000, in which loss Vermont shares heavily.

It is necessary to note its life history in order to know how to control it. The codling moth passes the winter as a pupa in little nests under the loose bark of apple trees. Many of these pupae are destroyed by being eaten by birds. In the early spring the pupa changes to the adult, becomes a winged form, and lays eggs on the young leaves of apples. These eggs are deposited on the smooth upper surface of the leaves, and are generally located quite near a cluster of apples. From these eggs, in about ten days, hatch the larvae or worms, which travel promptly to the calyx end of the apple, locate in the calyx cup, and, unless checked, enter its flesh just after the blossoming season and destroy the fruit. This is the critical stage in the life history of the codling moth.

Spraying is the most approved means of control. If two pounds of arsenate of lead are added to the regular bordeaux mixture, one has a suitable preparation with which to combat this insect. The time and manner of its application are important. Two sprays should be used, ten days apart: the first just after the blossoms have fallen. It is imperative that this first spray fall directly into the calyx cup, which is the point where the insect begins to feed. A high pressure, at least one hundred pounds, is needed. This second application, ten days later, is designed to catch the late hatching eggs, and the late blossoms. Both applications should be timely, and the work thoroughly done.

Curculio. This insect causes many of the knotty apples, plums, and peaches. The signs of apple infestation are the irregular shaped specimens with numerous pits and depressions. On plums its presence is shown by the gummy exudation on fruits, together with the crescent shaped scars. The adult is a snout beetle, which hibernates for the winter in grass, rubbish, or on the trunks of old trees. Its eggs are laid in May or June, and are deposited under the skin of the fruit. The larvae, or worms hatch from the eggs thus deposited and find good feed in the flesh of the apple and are safe from poisoned food. Infested fruits generally drop prematurely.

There are three means of control:

1. Spraying with arsenical poisons. Since the adults feed to some extent on the foliage, many of them may be killed by spraying the leaves.

2. The destruction of fallen and infested fruit will break the life cycle and eliminate many individuals.

3. The practise of clean cultivation disturbs the larvae which pupate in the ground in late summer and lessens their number.

Apple maggot. This insect destroys many early apples, and renders inedible many sweet winter varieties. The adult insect is a small, two-winged fly which emerges in July and lays eggs most of the summer. These are deposited under the skin so there is no opportunity to poison the worm; and since the adult fly is not known to feed on the host plant, it cannot be killed by spraying.

Prevention is the only known means of control; the destruction of the wormy specimens, in order to break the life cycle of the maggot, the pasturage of the orchard land with sheep or hogs and the plowing under of the wormy fruit, or its harvest, and destruction as soon as it falls from the tree.

Oyster-shell bark louse. This insect lives on the bark of twigs and branches, and sucks the plant juices, thus killing the twigs. It is particularly injurious to small trees or to cions on newly grafted trees, and often destroys the fruiting branches on mature trees. A hard and bony scale protects it from injury. The mature insects are about one-quarter of an inch long, are brownish in color and are often scarcely distinguishable from the bark on which they live. As the name indicates, they are shaped like an oyster shell, a fact which helps one to recognize them. A number of sprays are used effectively against this louse. The prepared oils or the lime and sulphur solutions, generally give good results. Applications of the corrosive sprays should be made in the late winter or early spring; always before the buds open and to be of any value must be thoroughly done. Every portion of the infested tree must be sprayed. One branch left untouched will serve as a breeding place for the next brood.

The successful control of any insect depends upon a knowledge of its life habits and of the vulnerable points in its life cycle. Familiarity with spraying operations and other control measures are also very desirable. For insects which eat foliage or fruit, a stomach poison like arsenate of lead—two pounds to fifty gallons of spray mixture—is used; for insects which suck, like the oyster-shell bark louse, contact sprays like the lime and sulphur solution.

DIAGNOSIS AND CURE OF POTATO DISEASES.

B. F. LUTMAN, PROFESSOR (pro tem) OF BOTANY, UNIVERSITY OF VERMONT.

The Experiment Stations in different parts of the country have developed particular lines depending in part on the dominant type of farming industry of the state in which they are located. Thus at the Illinois station corn is king; Wisconsin makes much of dairying; North Dakota of the pests and other maladies which attack the cereal crops. In the same way for the last twenty years the Vermont station has studied the potato, its breeding and its diseases, Professors Jones and Stuart, the former botanist and horticulturist, being active in this matter. My connection with the work has been a matter of but a few months, so I cannot speak with the same authority that either of these men would. A large part of what I have to say is drawn from their work and, especially that of Professor Jones, who, with his assistants, has studied the diseases of the potato, while Professor Stuart has dealt more particularly with disease resistance.

During the last ten years, all food products, especially cereals and cereal products, have risen greatly in retail price. The potato has shared in this rise; yet it is one of the relatively cheap foods. It is our cheapest source of starch, a most important nutrient, and for that reason its development, is encouraged. Furthermore the great growth of Germany's alcohol industry is due to the augmented potato acreage since from potatoes they produce the bulk of their alcohol. The same crop may well be used here in the production of denatured alcohol.

While potatoes are a standard crop, they are still a most uncertain one. Yields vary greatly from year to year. There are several reasons for this. In the first place, we think of the potato as being an old settler, as normally belonging in this climate; but it really is a plant of comparatively recent introduction, not native to this climate, but a semi-tropical plant, originating in the high, tropical valleys of the Andes. Brought to this climate and grown under conditions to which it is unaccustomed, conditions moreover which have the same effect upon a plant as they would have on a man, the potato is still not entirely acclimated here. Our season is from one-third to one-half shorter than that of the summer season to which the potato is accustomed in its original habitat. Furthermore, our climate is hotter during part of that time and dryer as well. Those changes in environment have made the potato susceptible to the inroads of many diseases.

Another reason why the potato is more subject to disease attacks than are many of our cultivated plants, is the peculiar

breeding to which it has been subjected. Its normal method of reproduction in Peru, where it originated, is either by flowers or by tubers; but in our endeavor to get large crops, we are forcing the potato to use only the latter method. But the plant still tries to reproduce by means of flowers. Flower reproduction makes a draft upon the energy of the plant, and so does tuber reproduction. And in our short season we have forced these two methods of reproduction together, requiring the potato to produce flowers and tubers at very nearly the same time. This severely taxes its energy. The plant cannot stand such an expenditure of its energy, is weakened as a consequence, and thus is more susceptible to disease and to injury.

The tuber doubles in size from mid-August to harvest time. If then we can keep the plant green and the leaves producing starch during the latter part of August and September, the yield should be doubled. It is at this time, while the plant is trying to produce both flowers and tubers at one time, that the physiological diseases occur. What is a physiological disease? The plant lives normally in a state of equilibrium with its surroundings. If conditions are good the plant flourishes; if not, it dies or its vigor lessens. The plant needs water, sunshine and proper soil conditions. Its leaves continually give off water in vast amounts.

In droughty August, the plant fails to get from the soil all the water it needs. The visible effect of this lack of water is shown in the leaves, as a browning and curling of the tips, a condition which is called tip-burn. The water comes up the stem of the plant as sap and along and through the veins of the leaf, but being in insufficient quantity does not reach quite to or supply the tip of the leaf; and as a result the tip dries up.

The effect of tip-burn on the yield is to curtail it. The amount of healthy leaf surface determines the amount of starch the plant is making. Potato plants possessing large leaf surface make plenty of starch, providing there is plenty of sunshine; for sunshine is as important as is leaf surface in this building of starch. However, all the sunshine in the world without leaf surface will not make starch; but with both present, starch is formed in the plant. Tip-burn lessens the area of foliage exposed to the sunlight and proportionately lessens the amount of starch formed in and by the affected leaf, and lessens the tuber crop formed from the starch the leaf gathers.

Insect injuries result usually in the riddling of the leaf with holes or its partial or complete destruction by eating. They have the same effect as does tip-burn, for they lessen the expanse of the leaf surface, lessen the amount of starch produced by the plant and lessen the crop. Many sorts of insects cause these injuries; more particularly the flea beetle, and the potato beetle, and, occasionally, grasshoppers.

The fungous and bacterial diseases are usually the most destructive type. The early blight appears usually in late June or in

July. It causes gray,concentric ringed spots which may appear at any point on the leaf. It is not as destructive on the whole as are some of the other blights, although occasionally wide spread.

The most dreaded malady is the late blight or mildew. This is a disease that caused the Irish famine in the forties of the last century. The peasants at that time depended on the potato largely for their sustenance; so when the blight destroyed the entire crop in 1844, they were reduced to starvation. The late blight attacks both leaves and tubers. Its appearance on the leaves is indicated by parts of the leaf having a water soaked appearance. A sort of mildew appears on the surface of the leaf, more particularly after a damp night. All through the attacked portion of the leaf the fungus parasite bores, consuming the starch and the substance of the leaf, causing its death and coming to the surface to spread itself to other leaves. The fungus is active close around the dead part, advancing into the leaf and increasing the size of the spot from day to day, if the weather is muggy, damp, and warm.

This fungus, different from that of the early blight, also attacks the tubers. The loss is more noticeable in the tuber than it is in the leaf. It appears in the tuber either as the wet rot or the dry rot. A potato affected by the fungus shows black sunken spots where it has entered the tuber. If the crop is kept in a dry cool place, this disease is not apt to go very much further, for quite a while; but it develops slowly, advancing into the tuber, until in time it simply dries up, producing what is called dry rot. If, however, the crop is kept in a damp or warm place, it is apt to rot quickly, becoming simply a mushy mass, the wet rot. In short, the turn the disease takes, be it the wet rot or dry rot, is simply a result of the conditions under which the tubers are kept after they have become affected by the disease.

Black-leg is not of much importance in Vermont, although it has occurred in our plots quite a number of times. It is a bacterial disease affecting the potato stem just at the surface of the ground, producing there a discoloration, as a result of which the entire plant is stunted and the crop lessened. Late and early blights are fungous diseases caused by little plant parasites, but black-leg is a bacterial disease, caused by another sort of plant parasite. It should be looked out for. Not all discolored potato plants are affected with black-leg; but a blackened condition of the stem at the surface of the ground is a suspicious sign.

The potato scab is a familiar potato disease manifested by a roughening of the skin. The potato is covered with a brown layer upon which acts the fungus which causes the scab. The earlier the tuber is attacked the deeper the injury. As the potato enlarges, the fungus grows deeper, the disease spreads over the surface; and the growth of this brown layer is stimulated, until a very thick layer is produced, forming a sort of a scurfy mass on the surface of the potato.

Another malady worthy of mention, which may not occur here, but which should be looked out for, is a disease discovered at Ottawa, Canada, by Professor Gussow. It was probably introduced from Europe in imported potatoes. It is characterized by a swelling of the side of the tuber, producing an abnormal growth in the form of a canker, distorting it. It is a fungous disease, but the life history of the parasite has not as yet been thoroughly worked out. Suspicious specimens should be sent to the Experiment station, with a view of learning the likelihood of its gaining a foothold.

We cannot do much to combat some physiological diseases, save to give the crop a thoroughly clean soil and to depend on the season's rainfall. Tip-burn ravages, however, can be lessened by the use of bordeaux mixture. Bordeaux, of course, is the standard remedy for the regular fungous diseases; but it is also a cure for the tip-burn. The bordeaux as we use it here is made up in the 5-5-50 mixture—five pounds copper sulphate, five pounds lime, and fifty gallons of water; to which arsenic, paris green or arsenate of lead is added as an insecticide. Arsenic, of course, should not be applied to the potato plants without lime as it injures the leaves. We spray three to four times with this mixture, beginning early in July and repeating every two or three weeks thereafter. The effect of bordeaux on the leaves is interesting; the sprayed foliage being a much darker green than the unsprayed. It is a question just how the bordeaux is effective as a fungicide. Perhaps it stimulates the plant, making it so healthy that the fungus cannot attack it. Bordeauxed potatoes compared row by row with potatoes that are not bordeauxed show a striking difference. It may be not so much the copper clinging to the leaf surface, as it is the condition of the leaf, that enables the latter to resist the fungus. The dark green leaves of the bordeauxed plants do not show the tip-burn as much as do those not bordeauxed, although they show it to some extent. Where an unsprayed plant shows the tip-burn to the extent of from one-third to one-half of the foliage, there will be only a little point at the tip on the bordeauxed leaves.

An increase in yield is apt to occur even if no fungous disease is present. It is a question sometimes whether it pays to spray with bordeaux. Our results for nearly twenty years, a range of time including years when there was disease and others when there was none, show an average increase as a result of spraying of over a hundred bushels per acre per year. Spraying with bordeaux lengthens the life of the plant and increases the yield, even though there is no disease, and this increase is sufficient to pay for the cost of spraying

If potato scab is to be prevented, clean land and clean seed must be provided. If potato scab gets into the soil it is difficult to get it out, it being retained for twenty-five to thirty years. Therefore the only remedy is to plant clean seed potatoes on a

non-infected soil and so keep it out of the land. To prevent the seed from carrying the disease it ought to be disinfected, the disinfectant recommended being formaldehyde in the proportion of about one pound (or pint) to two gallons of water. If soaked in this solution for a short time the seed will be freed from fungus without impairment of its powers of germination. Liming the soil has a tendency to aggravate this disease.

DISCUSSION.

Is the lime and sulphur mixture an effective fungicide for potatoes?

As a result of trials at this Station it had been found that nothing equaled the bordeaux mixture.

What constituent in bordeaux causes the plants to remain in healthy condition longer after being sprayed?

It is probably the copper.

NEW YORK AGRICULTURAL SCHOOLS.

H. E. COOK, DEAN OF THE SCHOOL OF AGRICULTURE OF ST. LAWRENCE UNIVERSITY, CANTON, N. Y.

I have no set address, but will tell you some of the things we are trying to do in our State, and because of our like conditions, that which will be helpful to us should be suited to your needs. I think in Vermont you need, agriculturally speaking, a little moral dynamite and if you are like New York, that means that we need the same sort of medicine,

Generally, all through the East, we need stirring up. We have good men. Where can be found a finer type of men and women than throughout this north country from New York to Maine? But many of us are glued down to our environment. We need the same exploitation that has built up the West. I am not sure but we need it more than we need phosphoric acid and potash; a general stirring up to an understanding of our great natural undeveloped opportunities.

Lest there be some misunderstanding, let me say that I talk from the standpoint of a farmer rather than a school teacher,

because I never taught school in my life until I went to Canton a year ago last September; and I am there, not because of any relationship to university life, but because I have a little of that exploitation ability that sees first the necessity of stirring things up and of arousing men to see and to seize their opportunities. I have been making butter and cheese and doing farm work all my life.

Now, a problem that has concerned us in New York, and I believe it has been characteristic all through the East, is that our agricultural education has not been quite closely enough related to real farm things. When you look back over the last 20 or 25 years, and that covers the period of time in this country that we have been talking agricultural education, we have been very largely developing agricultural teachers, agricultural investigators and agricultural thinkers. As Mr. Stadtmueller has said, the opportunity in this country for earning dollars has been somewhere else than on the farm. This proposition is founded on dollars, and when the opportunity for the young man is greater elsewhere than on the farm, whether he is educated or not, he will leave. We have been training young men in agricultural colleges very largely for investigators and teachers.

We have in our school a department where domestic science is taught, and which was founded for farm and village girls where they could be taught housekeeping. They have not come to it because there is a greater opportunity for those young women to teach, and so our course has entirely changed from its first conception and is now a normal course and we are training young women for teachers and not to go back to the farm, which was the original conception of that branch of the institution. We shall no doubt repeat in the teaching of household economics the experience of the past in purely agricultural matters. First, teach teachers; and then, when that field is filled, we shall teach industrial workers.

For two thousand years men have been going west. If you go west now, you go east after you have gotten to the Pacific coast, and if you go far enough you will get back to the first land that was planted and cultivated. But that means a good deal more than that to me; it means that our agricultural education will be in the East. We must make it possible for our boys to go out on these fields and grow corn and potatoes and produce milk, and do this at a profit; in other words, so that there will be an opportunity for the boy or girl to get just as much net income out of farming as out of other enterprises that require a corresponding amount of gray matter. That is what we are trying to do in one agricultural school in New York State.

We have had in the State of New York one of the best agricultural colleges in the country. Within three years there were more agricultural postgraduate students at Cornell than in all of the other institutions combined. Up to 1903 or 1904 that is about all we had been doing; but a few men in the State thought there should

be an awakening. Now, a few men that were interested in the welfare of the State as a whole banded themselves together and we succeeded in making a start and in putting a bill through the legislature giving $250,000 for agricultural buildings at Cornell. We got not only that, but we succeeded in breaking down a prejudice against industrial training, and that is one of the things, perhaps, you ought to fight out in the State of Vermont. If you have the same prejudice, you must get together and with your Dairymen's Association, your Poultry Associations, and your State Grange and every agricultural interest in the State, go down to your State capital, hire your board and lodging, and stay there until you get what you want and banish prejudice and jealousy and such nonsense from the State of Vermont, and get what you ought to have.

Now, we came pretty near clearing the atmosphere in New York State and we had ten times as much to fight against as you, because we had seventeen colleges in the State lined up against us. We succeeded in wiping out much of this prejudice against industrial training. Distinguished men have told me that it was the greatest educational victory of recent times, because we did away with most of the jealousies and prejudices against teaching a man the things that he is going to do. If it is to grow potatoes, teach him how; and, in my opinion, it will take as much gray matter to learn the science of growing potatoes as it will to learn Greek.

Now, out of that movement in New York has grown these schools for secondary work. We have three, one at Canton, one at Alfred, and one to be erected at Morrisville. Our educational institutions had no part in the establishment of these schools, nor do they control them; but they are established and are, I think, doing good work. The probability is that the time is not far distant when schools of that type will have to be related to some central or educational board.

As the situation stands at our school today, it is this: a boy comes there without any qualifications whatever. We have one boy who left school when he was eleven and has not seen the inside of a school room since, and he is now 28 or 29 years old; and they run all the way up to boys who have had three years of high school work. I am of the opinion that if you are to undertake work of this kind in Vermont, these schools ought to have some relationship to your Agricultural College. If a boy takes two years, I think the school should be so related that at the end of the two years if he wishes to go on and complete his four years' course at the Agricultural College, the two years which he has already had can be made a part of the four years' course.

We want boys on the farm. Now there is no chance for those young men, when we get through with them, to do anything else but farm. We have not trained them for teaching, they are not graduates. Measured by the standpoint of agricultural finish, they are not finished. The only thing they can do is to go back to the farm. They have been developed to grow potatoes and

cabbages and to milk cows, and not for other purposes. And I am not sure but that this way of getting at the youth of our section may be the very best thing that ever happened for the agricultural interests of Northern New York.

Here is our problem today: We are having to do too much high school work. Here is this young man that I just mentioned, he knows nothing about percentage or fractions. There is no use trying to work out a fertilizer problem for that boy until he has learned the mathematics that the problem calls for, and that can be followed throughout the school work; which only goes to show that fully one-half of our energy today is being used in ordinary high school work.

You have driven the farm boy out of the high school unless he is going into some profession. The graduates of high schools who have gone back on the farm are not plenty. There is no reason why the arts and science courses in our colleges should direct the courses in our high schools. We will never get the full benefit of agricultural education until the agricultural colleges have as much to do with the high school courses as do the arts and science courses of our colleges. I hope our high schools will soon be directed so that they will be spending time in teaching agriculture as well as English history.

To run our school it will take an endowment of $1,000,000 and if we continue to grow, that sum would be insufficient. The states can not afford to build schools of that sort to teach high school work. Your young men will go to your local high schools just as soon as you give them what they want. What percent of your Vermont boys that leave the grades graduate in your high schools? They do not go and they will not go unless they are to continue their work, because that high school does not give them what they want to earn their bread and butter. You have got to redirect your high schools.

In these secondary schools we must have the support of the farmers, and if we have not, we cannot do very much. Not only from an educational point of view, but from a business point of view, the farmer is different from the man in town. The farmer has earned his money from his farm and he is a different type of man because his surroundings are altogether different. The first thing he wants to see is that his boy can take a concrete situation before him and do something with it; and if he cannot the "old gentleman" is not in very hearty sympathy with the movement; and he is right about it. Purely academic work does not appeal to that man. It seems to me the first thing we should do is to find out whether the teaching inside would work out in the field, and if not it is not good.

We have been running three years. The first year the work was done in a little old house, the next year we had a few more students and went into the university buildings, and this last year the business has blossomed out in a much more satisfactory way.

We had 60 acres which grew in 1908 about stuff enough to keep three horses. It was the worst agricultural proposition that I ever saw. It took a good deal of courage to begin farming on that piece of land; but this last year we had $941 left after paying every dollar that went into seed and fertilizers and labor on the 60 acres; and that has had more to do with putting the institution on its feet than all the talking I could do. Of course there was a class of people who were "agin the whole thing"; but when they saw us dig 402 bushels of potatoes from land that had not grown anything before, and saw the five acres of cabbage and 15 or 20 acres of corn, every acre big and thrifty, that appealed to them. We have every figure and our account was so accurate that it balanced with the treasurer's books. We cannot do on our own farm what we are doing there. We are paying $1200 for a book-keeper and he is working all the time, and I do not think he is doing any more work than he would on my farm of 40 or 50 acres, but we are finding out the cost of farm products.

What does it cost to raise a bushel of potatoes? Few of us know. We need men to help us in working out the cost of producing those things and it seems to me that a school of agriculture ought to be founded on the commercial side of farm business and farm work, and that is the side we are working on.

We have registered this year 115 students and we are endeavoring to get in touch with the agricultural movements in our territory. This institution ought to be the center for the agricultural and business life of northern New York. I believe a state educational institution that handles state money ought to give courage and energy and become a part of the business life of the State. It ought to reach out into the homes. We are establishing demonstration farms throughout northern New York, but not experimental farms.

We shall establish a school of forestry, because northern New York forests afford the greatest opportunity for forestry study, probably, of any place east of the Mississippi river. Our conception of education in the past has been that it was locked up within the four walls of a room. I would like to see, in New York, our educational movement bounded by the boundary lines of the State of New York when we are spending state money.

Is the solution of this problem agriculture in the high school, or an agricultural high school? I think it is the first. Because of the tremendous expense involved we have got to have agriculture in the high school. When our boys and girls are in the country grades we ought at least to have them in an agricultural atmosphere. It is the point of view that affects the men and women, so that when you get a boy through he says, "Here is an agricultural school, I need this training." Maybe later we will have our agricultural high schools, but I think that is secondary to the first proposition,—to get our high schools directed so that the boys will get what they are hungry for. We have been sending

the boys back to the farm, if they went back at all, to get the training from the farmer, rather than sending them to school.

I am firmly convinced that our eastern soils have greater possibilities for crop growth than have the soils of the Mississippi valley, after we have learned to care for them. Once drained, filled with organic matter, and throughly tilled, these old granite soils are to be the very best of which America can boast.

ELEMENTARY AGRICULTURE IN PUBLIC SCHOOLS OF VERMONT.

D. H. LAMBERTON.

Each day, each year, each generation, each century and each cycle leaves its traditions, its unfinished business and to some extent, its habits, good and bad, as entailments upon the similar periods of time that succeed as time runs. Barring now and then a new stunt (and new stunts are by no means as common as they seem), we are largely what we are because of the entailments of these time periods. So it was, too, with our forefathers, and so will it be with our children and our children's children to the end.

On its face, this statement of fact seems discouraging and unprogressive. So it is and so would have been its bearing upon the race were it not subject to constant modification by forces that are supplementary to the penalty accompanying the ejectment from Eden—" In the sweat of thy face shalt thou eat bread.'' The Amazon Indian who can pick his daily bread off trees, and who only has to wait for milk of the cocoanut to sour to have at hand all the essentials for going on a drunk, is just where he was when the Almighty turned him out to pasture. If we are different from him, it is less because similar inheritances are not common to both of us than because our geographical location has forced us to hustle a good part of our time to make sure of cover from the weather and of something to eat.

Stripped of all superfluities, this life of ours is reduced to two essential elements—shelter and food. Integrally it has not changed one iota since our old troglodyte grandfather lived in a hole in the ground like a woodchuck, or since our somewhat more recent ancestor bossed the inside of a dark and fireless cave, drank the blood, chewed the uncooked flesh and sucked marrow from the bones of the cave bear, the mammoth and the mastodon. Shelter and food—how they may be come at—always has been and still is the problem dominating human endeavor, and all the

way from the rags and crusts of abject poverty up to the climax of sumptuous living, the difference between the state of man and man's estate is one of comparison, only. Ah, this keeping out the cold and this keeping the "wolf from the door" is the all-absorbing business of all but a very few out of the fifteen hundred millions of people inhabiting the earth.

Therefore, it follows as the most important corollary of this mightiest of propositions that the chief aim of education should be the applying of the most intelligently directed effort in the teaching of the most wholesome and promising ways of getting a living. By "a living," I mean not only the essentials of shelter and food, but, also, the measure of good things that contribute to peace, plenty, contentment and the mental, moral and spiritual riches, all of which are a goal rather than a birthright.

In a time very, very far away, certain of the great irresistible forces of nature were exceedingly kind to Vermont. For some reason still unexplained although burdened with a great weight of theory, a vast belt of glacial ice, with an advancing front practically as long as half the width of continent and with a depth sufficient, at least, to leave records on the highest mountain summits, came down out of the north. As speed is now reckoned, its progress southward was very slow, much slower than "joy-riding," for instance, slower than tax reform in our section of the region its mass overspread; slower even than public interest in the cause in behalf of which I am now speaking. But if slow, its progress and its work were certain and through all the uncounted ages of its existence and movement, the ice belt ground away at resisting mountain walls, garnered its grist and conveyed it onwards.

The grist of that great ice mill presents all grades of grinding from fine to coarse. As examples of the fine product there is the fertile soil of your molded hills and your nestling valleys, and of the coarse, there are the boulder stones wherever they exist. And in that less of the coarse debris and more of the fine were deposited hereabouts, as compared with their ratio in most sections of the continent where glacial action was an important constructive factor, lies the especial kindness of the glacial epoch rendered Vermont. In other words, Vermont soil, by virtue of the thorough milling given its ingredients by grinding ice, before ever a bird of passage brought to it the seed of a grass, a tree or a flower, was fitted for the support of life at its best—fitted to yield to its tillers and to the dwellers upon it of other occupations—the sort of a living I have previously described. Do all the people of Vermont get from this provision of natural bounty all that it may afford? Is this wealth of resource sufficiently understood by the people so that public agencies of advancement are directed upon it as they should be? The answer to these questions is a negative one.

The day is not far distant when there will be no more virgin

soil for easy and remunerative cultivation, no more unoccupied lands for pre-emption, no more inducement for new agricultural settlement, anywhere within our national boundary lines. In the past, the sons and daughters of Vermont have gone out from the home acres to do a noble part in State building, because there was room elsewhere and, consequently, greater opportunity than here. Now, all this is so far changed or so far advanced in the processes of change that the turn of the tide is already imminent. The call of the great cities upon our youth still may be strong and irresistible, but the fond dream and irrepressible desire of the average city dweller is to return to the country life that he or his forbears sometime relinquished. Besides land limitations and the tendency of exodus from city back to country there is a force—it is one of those life essentials mentioned at the beginning of this address—that is dictatorial in its demands. Regarding this force, an economist of national fame recently has said: "We have seen the last cheap bread in this country. Anyway you can figure it, we are near the end of cheap food in this country, which means that population is beginning to overtake the food supply. This is the fact, and from now on the overtaking will be swifter. There is just one way in which a proper balance between demand and supply may be maintained, and that is by greater production on the part of farmers. Their fields must be made to yield more and this may be done by the adoption of better methods of farming, greater industry and care and the prevention of waste of time and effort."

To meet this change presaged by all the signs applicable upon the future, more must be made than ever has been made of agricultural opportunity in fields old to the work as well as in those new to the work or newer. This means better and more intensive farming in Vermont, or that the people of Vermont are dormant or recreant to their glacial heritage, ground to their hand in the ice mills of the long ago. This means more and more intelligently directed effort to the end that country life here may be all that it may be here.

I would not be understood as assuming that there is not superior or intensive farming going on in Vermont now, for there is, and a very congratulatory amount of it, too. But for every ten acres so farmed, most likely, just over the hill or across the valley there are twenty-five acres, equally resourceful, that are yielding less fruitfulness. This difference, in all probability, is in direct ratio with the difference in intelligent direction applied upon the two areas. Admittedly, this should not be so, and, if we are to meet coming changes with progression, it must not continue to be so. How may this difference be made to disappear? How is all poor workmanship made to disappear? By directing upon the work more intelligent effort. Except the rather infrequent natural-born genius, skilful workers are the products of education and training.

In making ready for this change, where shall we begin? Logically, we must begin in some agency that reaches all the people and, too, with one that influences the people in their impressionable years. In common with other States, Vermont has a college of agriculture that is doing a great work, but from the nature of things, no agricultural college can so serve all the people that a popular change in thought and habit may come of its influence, any more than an institution of higher learning following lines more strictly literary can give all the people university training; indeed, the agricultural college, while indispensable to the training of experts and instructors in agricultural science, must ever have limits upon its usefulness. To a comparative degree, also, agricultural courses in the high schools, in the normal schools and in trade schools, must fail to reach the masses in the way needed.

On this line, some States, notably Alabama, Georgia and Wisconsin, have established a new kind of school for the especial purpose of teaching by means of agriculture, country life, household life and kindred subjects. Although still in an experimental stage, no doubt these schools are an important step in the right direction, but if Vermont were to establish similar schools in the same ratio of number of schools to population (and we could not afford to increase the ratio) there would be just two of them in this State. Not without reason has complaint been heard that our three normal schools are most largely serviceable of their immediate vicinities and it is reasonable to suppose that a less number of agricultural schools in the same territory would be open to relatively more emphatic criticism on the same account.

Sometimes the *necessitous* method and the *best* method are one and the same in matters of public moment as well as in those of private concern and such apparently is the case in moving for general elementary instruction in agriculture here in Vermont. The State Agricultural College is doing all that it can; the normal schools are crowding over much now into their short courses; the industrial high school is still a dream in Vermont, if we except the institution at Vergennes, the splendid privileges of which are open only to the boy or the girl who commits a crime; special schools in elementary agriculture in numbers sufficient to meet requirements cannot be afforded; and thus does the cold argument of elimination bring us down to the common village and rural schools as the most available agency for this work of reform. These elementary schools stand the *necessitous* test and they stand the *best* test because only within them is the great body of industrial workers trained.

The question here arises—"Are the common schools ready for the redirection that shall make them potent in raising country life standards? They are just as ready as they ever will be until redirection is actually begun. The longer their redirection is delayed, the longer will we remain laggard and unresponsive to

the needs of the hour and the signs of the times. That Vermont is behind in this movement must be admitted, and this, too, in the face of the fact that nowhere on earth are there greater inducements for the development of country life to a point as near paradisical as is good for us mortals to acquire. Thus are we admonished to get busy.

The vitality of all our schools depends upon how far they recognize the essential activities of men and women. That agriculture and the occupations related to it are among the most essential of activities, cannot be gainsaid. How far does the common school recognize the activities? Just so far as it ever has done, which is not at all. The common school is one of the most artificial things in this world. Although its environment is the concrete and the natural, its first and last lessons are plunges into the abstract and the artificial. All its text-books come to it from city makers, while the great text-books of nature lie all around, unnoticed and unopened. The weight of its impressions deals with inducements to break away from rural surroundings as soon as possible. Unintentionally on the part of authority responsible for its usefulness, it is a breeder of discontent and a creature subservient to special privilege. For the few whose endowments can measure up to leadership, it is a grand and meritorious institution; but for the many who must do the everyday work of the world—the work that brings the "living" I have previously defined—it performs no service specialized to their practical needs.

The welfare of the common school is something uppermost in the public mind, and taxpayers, almost universally, go the limit in providing for its support. In prevailing supposition, no institution is conducted more for the benefit of all and less for the special privilege of none, than the common school. Yet, what are we doing within it for the boy or the girl, whose restrictions dictate a future never far removed from the commonalities of life? We give them a little arithmetic, a taste of English grammar, a nibble at United States history and some geography, the last named pivotted around anything and everything outside of country life that you can hang your hat on. These subjects they get because they are necessary to the limited number of boys and girls who will go upward to higher learning and outward into business or the professions. For the few, there is special training at public behest, almost to the limit of their need; for the many, there are the venerable and bewhiskered "three R's," and in the past twenty-five years we have so complicated those that reading and spelling have almost lost their identity as essentials.

For the man who preaches to us during twenty-five or thirty minutes on Sunday morning; for the man who comes on call, looks at our tongues, feels our pulses, thrusts a clinical thermometor down our throats, and leaves behind him a few tablets or pills; for the man who leads us into and out of litigation, di-

vorces our wives and writes our last wills and testaments in proof of our insanity; for the man who takes our savings and pays us three-and-a-half percent for our dollars upon which he is getting six or eight percent; for the man who specializes in any old thing but agriculture and the making of rural life better, richer and happier, the common school sheds the last drop of its blood. Think you not that it has favored the few and neglected the many long enough? Indeed, it is high time that the common school began to render measure for measure with impartiality to all and with prejudice towards none.

No other factor may be so potent in giving "set" to the life of the individual as the common school. Not all men should be agriculturists, but all men are dependent upon agricultural emolument, directly or indirectly. Elementary education should be attuned to this fundamental basis of everything. The tendency in the past generation has been to complicate the subjects taught in the elementary schools. The duty of the present generation is to simplify down to the very bone. This simplifying process involves no less a task than the redirecting of the aims and purposes of the elementary school. Faddishness must be thrown out, indirectness must be superseded by its opposite and the bonds of overorganization must be loosened. No longer may the city school be taken as the model for the country school. The latter, as a country institution, must be made serviceable, first of all, of the best country life with the fitting for all other kinds of life as incidental.

The rural school has a greater responsibility than the city school, because it trains for both city and country residence; indeed, the rural school is within the sphere of the beginnings of most of life's occupations. In redirecting the purposes of the rural, there should come to the front the elementary subjects inherent in and necessary to country life. Now, everything taught comes from outside. The change simply would permit the child to begin his education in his own world.

The prime essential of this redirection, as at present applicable in Vermont, is less a specific course in agriculture, than to give every subject taught in the rural school an agricultural trend. The primary means is nature study, or the study of nature personal to the child. His geography should begin right at the "Little Red School House" and he and it should walk together across the fields, down the brooks, amid the woods, among the herds and along the roads. Beginning so and continuing so, geography alone, in ten years' time, may be so taught in a rural school as to revolutionize the agriculture of a community.

In the same spirit should the child be led into the subject of arithmetic. Arithmetical problems for rural school consumption have theretofore dealt with the theoretical, urban, middlemen or partnership subjects. The local subjects are many and include soil-moisture, soil-fertility, stock-feeding, labor accounts and

simple accounts of other kinds. Beginning so and continuing so, arithmetic alone, in ten years' time, may be so taught in a rural school as to revolutionize the agriculture of a community.

Again, in the same spirit, reading and related language subjects may be so chosen and so directed as to open wide avenues of interest and knowledge vital or applicable to country life. There is just as good opportunity to teach grammar and spelling out of Commissioner Martin's annual report as from "Thanatopsis" or "Paradise Lost." Beginning so and continuing so, reading and related subjects alone, in ten years' time, may be so taught in a rural school as to revolutionize the agriculture of a community.

To this redirection of existing essentials, add manual training modified to rural pursuits, like gardening, laying out of paths, sawing a board off straight, driving a nail true, mending a strap neatly, pruning a fruit tree properly, and so on. Beginning so and continuing so, manual training alone, in ten years' time, may be so taught in a rural school as to revolutionize the agriculture of a community.

Now, how may this redirection be brought about? More than is the case in the cities, the country school is what the *teacher* makes it. The system of district supervision now established and extending in Vermont is a great help to the teacher, but, after all, aids have served their purposes; she, in large measure, must work out her salvation alone. She is certificated for her work by the State, and therefore, the State is her sponsor in her qualifications. The State insists that she possess a certain amount of knowledge in a variety of subjects. If the State should require that she should prove her capability to teach obligatory subjects with the necessary agricultural trend, the necessary country life trend and the necessary home life trend, would she not rise to meet the new demand? Without doubt she would, because she always has responded to educational innovations. With the State in earnest of this matter, with the district superintendents watchful and helpful in the cause, and with the parental element in support of it, I believe the redirection would come about as harmoniously and as effectively as nature's own processes that the change would emulate.

With the leaven of redirection working in elementary schools, schools higher than those would have to recognize the new demand. The high schools soon would be fitting girls for the new rural teaching and so, too, would the normal schools. Not all the school children would become farmers or farmers' wives, but those who did would be better farmers or farmers' wives for the change. And so, too, with the doctors, lawyers, ministers, editors, artisans and all the rest—all would be broadened and bettered by the country "set" given their lives by an agency now stimulating the artificial instead of the natural. Each and every one thereby would start life with better assurance of finding for himself, and his dependents, the "living" previously referred to

in this address; the living, which besides shelter and food has peace, plenty, and contentment, and the riches that are mental, moral, and spiritual.

Under such dispensation, Vermont rural schools and her other schools in succession would be giving the training now lacking to children who remain in rural pursuits. That a large percentage of the children of Vermont must fight the battle of life very near its soil is true and should be true. That they have the right to be as well fitted for their calling as others are for some other calling, also is true. By means of public school redirection to that end, I believe rural life would grow in attractiveness beyond any present conception of it. I believe it would hold countless boys within its wholesomeness, who now rush away to the great centers of population, there to take the high road to destruction in prosperous times and to join the bread line of destitution in hard times. I believe it would hold countless girls true to the unsurpassed charm of rural homemaking, who now hasten away to the great cities to join the ranks of underpaid toilers, where the penalty is either shabbiness or shame.

In recent years, we have heard a good deal of "The New Vermont." The term is very inclusive, but not the least of its high purposes voices a trumpet call for the sons and daughters of Vermont to remain in Vermont, here to work and pray, to live and let live, to think and dream, to plan and execute for the betterment of all things near at hand instead of responding to the call of the will-o-the-wisps that beckon from abroad. And of all the theories that have been advanced, of all the isms that have been urged, and of all the propaganda that has been preached, I am confident in believing that the most important step towards hastening a realization of a "New Vermont" lies in such redirection of public school aims as befits the needs of a rural people whose heritage is the gem of gems among rural States, and whose inexhaustible resource is a willing soil, ground into fertility in the mills of the Almighty.

AGRICULTURAL SCHOOLS.

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The first existing agricultural high school in the United States was established twenty-one years ago, in connection with the College of Agriculture of the University of Minnesota. At

that time short courses in agricultural colleges were comparatively unknown; there were no separate agricultural high schools; the public high schools still clung to the traditional college-preparatory courses; the normal schools had not yet heard the call from the rural districts and continued to train teachers only for the city high schools; and the rural schools themselves were exotics bearing fruit mainly for the city marts.

PRESENT STATUS OF SECONDARY INSTRUCTION IN AGRICULTURE IN THE UNITED STATES.

Since that time there have been forces at work, which we need not examine critically at this time, but which have resulted in a very different attitude toward country life education, on the part of both schoolman and layman, and in a wonderful development of agencies devoted to the education of those who live upon the land. As a result of this changed attitude, this new view of educational material and methods, we have today about sixty agricultural high schools, or definitely secondary agricultural courses in colleges, between 300 and 400 public high schools and academies teaching agriculture, 109 state or county normal schools and 16 agricultural colleges training young men and women to teach more elementary phases of agriculture, and a number of private colleges and schools giving instruction of secondary grade or correspondence courses which are approximately of secondary grade, making in all about 500 institutions giving secondary instruction in agriculture. There are probably many more than I have mentioned of public high schools and academies teaching agriculture, but I have based these figures upon returns recently received in response to a circular letter sent to high schools which, through correspondence or otherwise, have come to be listed in our office among the institutions teaching agriculture. However this may be, it is apparent that the number of institutions in which some attempt is made to teach this subject is rapidly growing.

TYPES OF SCHOOLS TEACHING SECONDARY AGRICULTURE.

The institutions which are giving secondary instruction in agriculture may be classified roughly as follows: (1) the agricultural colleges, where instruction is given through definitely organized agricultural high schools, as in Minnesota, Nebraska, and other states, and through preparatory, special, or short courses of different kinds; (2) agricultural high schools in congressional or other large districts, as in Minnesota, Alabama, New York, and other states; (3) county agricultural high schools, as in Wisconsin and Michigan; (4) state or county normal schools; (5) public high schools and academies; (6) private colleges and schools; (7) correspondence schools. In this paper I purpose to deal

mainly with agricultural schools maintained apart from agricultural colleges.

Of these separate agricultural high schools receiving state aid, there are several different types, but they differ mainly in the size of the districts which they serve, and in the length of time required to complete the work they offer.

Congressional district agricultural high schools were first established in Alabama about fifteen years ago, and this state now has nine such schools. Each of these schools has a branch experiment station connected with it, receives an annual appropriation of $4,500 from the state for maintenance, is provided with land for experimental and educational purposes, and has a considerable equipment of buildings, animals and machinery. The course of study extends over four years of eight months each, and corresponds in grade to that of other high schools in the state.

Georgia has eleven of these district agricultural schools, which are receiving about $7,200 each annually from the proceeds of the state oil and fertilizer inspection fees, and $2,000 in direct appropriations. Each school is provided with not less than 200 acres of land, from one to four substantial brick buildings, and other equipment and facilities, all of which, except the maintenance fund, have been provided by local contributions. In these schools, also, the course of study extends over four years (of nine months each), but there are only two years of strictly secondary work. Other states having similar schools, although the states are not in every case divided into definite districts, are California, Minnesota, New York, and Oklahoma. Arkansas has made definite provision for four such schools.

The county agricultural schools were first established in Wisconsin in 1902. These schools have been equipped at the expense of the counties where they are located, but the state aids each school to the extent of $4,000 a year to be applied to running expenses. The course of study in each school extends over two years of eight months each, and is rather narrowly vocational, including agriculture, wood-working, iron-working, and domestic science, besides United States history, civil government, and commercial arithmetic. County agricultural schools are also found in Maryland, Michigan and Mississippi.

In the public high schools the courses in agriculture are extremely variable in character and in length. Rarely is the subject taught by a teacher having special training for it, though the number of such teachers is now rapidly increasing.

From an examination of recent data secured from 335 high schools in 34 different states, we found that 309 were teaching agriculture as a separate and distinct subject in the course, while 26 were teaching it incidentally in connection with other science work. Disregarding for the purpose of this inquiry the schools claiming to teach the subject incidentally, we found that 47

public high schools were giving four-year courses in agriculture; 11, three-year courses; 38, two-year courses; 90, one-year courses; and 123 courses representing various fractions of a year. The average length of time devoted to agriculture was a little less than 1.5 years. These schools represented a total enrollment of 54,700 with an average of 177 pupils to each school; and a total enrollment in agricultural classes of 9,500 with an average of 31 pupils in agriculture to each school.

In other words, one-sixth of the pupils in these schools are devoting about one-thirteenth of their time in school to the study of agriculture. The dose is rather homeopathic—one drop in seventy-eight—not sufficiently strong to cure rapidly the ills with which our system of rural education has become inoculated. But we are told that even bread pills work wonders on the mind of the patient, and the attitude of mind is an item of considerable importance in this matter of education. The essential thing is to keep up the spirits of the patient long enough to bring about substantial improvement or to effect a permanent cure.

From these remarks I would not have you infer that I underestimate the importance of this small beginning toward the general introduction of agriculture into public high school courses, or that I have any desire to belittle the movement for the redirection of those schools, to the end that their work may be better attuned to the needs of the pupils who attend them. I do not wish to leave such an impression, because I recognize the fact that the high school is not maintained primarily to prepare pupils for college, but to fit them for the duties and responsibilities of citizenship. I am also aware that the great majority of our citizens must work with their hands, and that it is both the right thing and the pedagogical thing to include industrial subjects—such as agriculture, manual arts, and home economics—in the courses of all schools attended by these future hand workers.

I believe that the day is not far distant when a boy or a girl may graduate with honor from any high school in this broad land without being compelled to devote a lot of valuable time to subjects which are useful only in meeting certain fixed requirements for entrance to college. But before that day is reached some large obstacles must be removed, some objections overcome, some demonstrations made. To aid in this movement, we shall undoubtedly resort more generally to the establishment of a limited number of special schools in each state, and these schools will perform some functions not performed by the public high school.

THE FUNCTION OF AGRICULTURE IN PUBLIC HIGH SCHOOLS.

This brings us to a consideration of the function of high school agriculture. I believe that secondary instruction in agriculture serves two main purposes: one primarily educational,

the other primarily vocational. Both are educational, but one is education through agriculture or by means of agriculture, while the other is education for agriculture and those engaged in it. Agriculture is much more than a vocational subject or an industrial subject. In one way or another it touches nearly every human interest and endeavor. In some of its aspects it is economic, in others social, esthetic, scientific. In a broad way, then, studied with reference to its human interests, agriculture is a liberalizing subject, a cultural subject. Considered from this point of view, agriculture becomes to the country boy, and also to the city boy, one of the best possible means of disclosing human relationships, the functions of commercial, political and social organizations, and the importance of scientific study and research. From this point of view, it should be studied in every public high school by boys who are to become captains of industry, leaders in finance, and professional men, as well as by the future owners and operators of farm homes and other agricultural enterprises.

THE FUNCTIONS OF THE SPECIAL AGRICULTURAL SCHOOL.

But agriculture is also more than a subject of broad general interest. It has a much more intimate personal aspect. The boy who has made up his mind to become a farmer, or a fruit grower, or a trucker, wants to know the *how* as well as the *why* of things.

I recently heard a young agricultural college graduate who had been placed in charge of a farm, bitterly deplore the fact that he, and others like him, could go through college and receive a bachelor's degree in agriculture without anywhere, either in high school or in college, or on a farm, learning how to plow, or dig a ditch, or harness a horse, or milk a cow. Such things are not taught in public high schools; they are not considered to be an essential part of "education through agriculture"; and, furthermore, the public high schools have neither the facilities nor the men to teach such things in any effective way. Nor do the agricultural colleges generally afford training in the practice of agriculture. Their function is to train leaders in agricultural education and research, and they assume that the details of practice have been mastered by the students before coming to college. But there is a best way to till the soil, grow crops, care for live stock, and manage the farm, which thousands of farm boys never learn at home and no city boy ever has an opportunity to learn. What shall we do for such boys; shall we leave them out of our scheme of public secondary education?

It was to supply this long-felt need that the first agricultural high school was opened in Minnesota twenty-one years ago—a school to which boys who had made up their minds to be farmers might elect to go for more thorough and effective instruction

and training in agriculture than could be had in any public high school, and for more practical training than the agricultural colleges afforded.

And because this Minnesota school succeeded in its purpose, and hundreds of boys and girls completed its courses and went back to the farms, where formerly ten completed the college course and remained away from the farms—because this school succeeded, several others like it have been started in connection with agricultural colleges, and many that are similar in purpose have been started as independent institutions.

These schools have been established and maintained to supplement the work of the public high schools on the one hand and that of the agricultural colleges on the other. They have not been intended to take the place of either or to compete with either, but to occupy an intermediate field which neither has fully occupied, much less cultivated. They have been supplied with real farms and farm equipment, with animals, machinery, shops and laboratories; and the more successful of them with faculties not single, inexperienced instructors, but *faculties* of trained experts—everything necessary to give effective instruction and training in the *business* and, to some extent, the *science* of agriculture.

And in not a single instance, so far as I have been able to learn, have these schools waged harmful competition with either the public high schools of the state or the agricultural college. Their students have been drawn largely from the boys and girls who at the time of entrance, would be found neither in public high schools nor in college—boys and girls who would not be attracted to the ordinary high school or are too old to feel comfortable in such a school, and those not well enough prepared to enter college.

In Minnesota, for example, public high schools have continued to multiply rapidly, and in spite of the fact that a separate state agricultural high school is now in its second year at Crookston, fourteen public high schools have within two years introduced agriculture and employed special teachers for their 599 pupils in this subject. Furthermore, the enrollment in the college of agriculture is five times as large as it was in 1905.

Similar striking results have followed the establishment of agricultural schools in Wisconsin, Nebraska, Oklahoma, and other states, but the example of New York State is the only one to which I shall call attention in detail. In 1907, the agricultural school at Canton was started with 12 students and that year the State Agricultural College at Cornell had 522 students in long and short courses in agriculture. The next year Canton had 40 and Cornell 618; in 1909, Canton, 63; Cornell 779; this year, Canton 98. Another new school of agriculture at Alfred has 75, and Cornell has more than she knows what to do with. I also have returns from seven public high schools in New York, (and

there are several others that have not sent returns) which have introduced agriculture within two years and now have 222 students in this subject.

It thus appears, that the influence of agricultural high schools is to stimulate rather than retard the introduction of agriculture into public high school courses, and that they do not reduce the attendance at the colleges of agriculture. The functions of such schools in a public school system may be briefly summarized as follows:

1. To stimulate the general introduction of agriculture into the ordinary high schools and in a general way to set the pace for and give permanence to secondary education in agriculture.

2. To aid in the preparation of teachers for the rural schools. This is accomplished in a definite way in Wisconsin by conducting teachers' training schools with the county schools of agriculture. But even in Wisconsin, which in 1907 had one agricultural college, two county agricultural schools, seven state normal schools, and ten county training schools, progress in training teachers for the elementary schools must necessarily be slow. If, beginning in 1907, all of the graduates of all of these institutions were to go into the rural elementary schools and remain there as teachers, it would take seven years at the then rate of graduation, to supply each school with one teacher.

3. To serve as vocational connecting schools between the public elementary schools and the agricultural colleges. In order to do this effectively, the standard courses of study for these schools should conform in a general way to that of the ordinary public high schools of the state. These courses should include instruction in English, History, Mathematics, Chemistry, and Botany, such as is generally given in good high schools. How this may be done in a practical way is shown in Circular 91 of the office of experiment stations, entitled, "Secondary Education in Agriculture in the United States."

4. To serve as schools to which boys who have chosen to become farmers may elect to go for more thorough and effective preparation for their life work than the ordinary public high schools can give.

5. To relieve the agricultural colleges of much of the secondary and short course work they are now compelled to do, to the detriment, in many cases, of their regular collegiate work and that of research in agriculture.

6. To serve the farming communities more intimately and sympathetically than the agricultural colleges can do, and more effectively than the public high schools can do. This they can accomplish (a) by conducting short courses for adult farmers at points remote from the agricultural colleges; (b) by extension teaching in different parts of their respective districts; (c) by rendering the farmers expert assistance and advice; (d) by conducting demonstration experiments on their own farms and on

those of leading farmers in their districts, and (e) by conferring with teachers in nearby public schools and assisting them in planning and conducting agricultural work.

7. To be most effective these special agricultural schools should be so limited in number that they will serve relatively large districts—ten or fifteen counties, depending upon the density of the rural population, the value of farm lands, and other local conditions. Experience thus far has shown that the county is too small a unit for the proper equipment and maintenance of such schools, and too small to supply a sufficient number of students. These schools should be large enough and have funds enough to maintain a relatively large faculty and an adequate modern equipment, so that their students will not only have offered to them a standard course of high school grade, but will also have opportunity to specialize to some extent along different agricultural lines.

The courses in agriculture in the different schools may well be varied according to the predominant agricultural industries in different regions, and there should also be short practical courses for those who cannot complete the standard course.

Agricultural high schools, whether connected with colleges or maintained separately, should be kept strictly *secondary* in grade, and there should be no pretence of giving collegiate instruction in such schools. There need be no fear that schools thus properly organized on broad lines and adequately maintained will have any tendency, as some of our educators fear, to peasantize the American farmer or to create undesirable class distinctions. If we were to establish a separate system of schools to which the farmer *must* send his children, there might well be cause for alarm, but no such thing is contemplated. Where special schools of agriculture have been established, the farm boy is still free to choose between them and the public high schools, just as in many of our larger cities the boy may choose between a technical high school and one of the old-line high schools. The special school simply offers the country boy a better opportunity to prepare for farming, if he intends to be a farmer; if not, he is perfectly free to go elsewhere. Nothing very peasantizing about that! There is nothing very degrading in the influence of an institution that gives a boy a chance to become a better workman, to broaden his horizon, and to prepare himself better to fulfill his obligations as a citizen.

And what of class distinctions! What is there to fear in the influence of a school that meets the farm boy with a better farm equipment than he is accustomed to see, teaches him in terms he can understand and appreciate, and inspires him with courage to look up and out, instead of grovelling in drudgery! Some of us forget that for decades and generations the farmer has been supporting "class-distinction" schools—schools that have taken all of his keenest and brightest boys away to business life or the

professions, and left him only "Bill," the dullard. Poor Bill! Because he could not master cube root and four-story, complex fractions; because he could not appreciate trignometrical formulas or logical syllogysms, he must drop out of school and grub out an existence on the old farm. No wonder he was dubbed "hayseed"! Class distinctions, indeed! If there is an influence above all others that good agricultural schools will have, it will be to do away with this questionable distinction which the farmer has acquired.

My friends, let us have no fear of the school that opens the eyes and strengthens the hope of "the man who works with his hands."

CIRCULATING LIBRARIES FOR FARMERS.

MISS FRANCES HOBART, SEC'Y VERMONT LIBRARY COMMISSION.

The question used to be, shall the farmer read? But that time has gone by. It is no longer considered necessary to ask whether the farmer shall read or not. The days when the farmer meant somebody who was merely a tiller of the soil, who perhaps was sold with it as a servant, or some one who was a black slave, no longer exist. The farmer is now one of the princes of the world. There is no one who is so independent of other men and has so many resources at his command as the farmer. No one is so independent of the different industrial crises which may affect people in other lines of business.

If the farmer should—read and who would dare to say him nay—let us consider for a moment why he should read. What are the benefits which he may get? Farmers are first of all a practical people, and generally the first thing they ask is, "What good is it?" No matter what you put up to the farmer, the first thing that appeals to him is, "What practical benefit is it going to be to me. Is it going to put any dollars in my pocket? Make my life any easier? The lives of my children any better?" You can not deceive a farmer as you can other classes of people. If you have any propositions to put up to the farmers you must have something to back them, to show why the things you have are of use.

If it is worth while for the farmer to read, the next question is, "What shall he read?" Years ago this state, and some other states, were more or less flooded with what they called the "Agricultural Library." It was a set of small, dark-covered books, of rather poor print, without pictures. It dealt with such subjects

as sub-soiling, theory of drainage and chemical processes of the soil, etc. It was thought that this would attract farmers and prove beneficial, and in many places clubs were formed. I find these books still lying around the state unread. I have no doubt the farmers took them home and failed to find anything therein that especially appealed to them. You would consider it a very poor lawyer who never read anything but a law book. It is necessary that lawyers should read law books, but their reading should not be confined entirely to them; the doctor should read something other than books on anatomy and physiology; and your school teacher must know something besides pedagogy. Then is it not a false position to occupy to claim that the farmer should read nothing but agricultural books? These are all right when used rightly, but it would be folly to say that the farmer should read nothing but agricultural books. I find libraries where they are buying a great number of books for the farmer to read, just as if he had a brain different from other men, which would not absorb anything save that which dealt with crops and stock. Should not he be able to avail himself of all the best things in books? Biography, literature, history and travel? Why should he remain ignorant of the lives of great men? Why not know about other countries? Or journey across the sea and read a story to relieve his mind? It is true that most of our farmers work very hard, harder than any other class of people in the world; and many of them, after they have worked in that way, require something in the way of relaxation for the mind, and that is one need which books might fill.

You would be surprised to know that farmers enjoy, sometimes, such books as "Six Girls." They also like some other lighter works, and there are farmers who must have something only of a political nature. I once knew a man who thought it was a sin to read anything lighter than the New York Tribune. Of course for such a man fiction would not be desirable. I do not think any one person, or more than one person, can lay down a certain class of books and say this set and no other class of books shall farmers read.

Then, too, why should not the farmer make some provision for reading, not merely for himself, but for the other members of his family? Nearly every farmer has a family of some kind, and the wife needs something for relaxation, for she usually works even harder than the farmer. She does not go out so much as he does, though in these days the separator and the cream wagon take the place of going to the creamery; but if the reading of the farmer's wife be very light indeed, it is a pleasure to forget that there is a mortgage somewhere that must be paid, or that Jimmie may have the croup, and all those things that make or mar the day. Only ten minutes spent in reading is worth a great deal to rest one's mind.

Now in regard to the children. We hear about the young

people leaving the farm. Why? There must be some reason, either real or fancied. If they leave the farm what are they going to get? There are much fewer things now that they are going to get than there used to be. The telephone, the rural free delivery, etc., have made life more desirable on a farm than it used to be for young people. Young people left the farms because they thought they could find something in the city which they could not get at home.

The first steps of our forefathers, in New England particularly, were in the way of education. They saw that they must have something in the way of a school, and after they had established schools they became a necessity. But after a certain point you can get no further in many town schools and when you get to the fifteenth year there is a limit. If you want to study anything further you have got to go outside the town. Is not there any way in which this can be supplemented? You know that all the knowledge which has ever been in the world has been committed to pen and ink, or, perhaps I might better say, to print. It does not make any difference on what subject, I doubt if there has been any kind of knowledge which has not been committed and copied sufficiently to make it still accessible in print. As Mr. Dana says, "All the best of the world's knowledge may be found in print." And here I want to read a quotation from Charles Kingsley, "Except a living man there is nothing more wonderful than a book. A message to us from the dead * * * * from human souls we never saw, who lived perhaps thousands of miles away. And yet these, in these little sheets of paper, speak to us, arouse us, terrify us, teach us, comfort us, open their hearts to us as brothers." It is impossible to deny the power of the printed page, the printed word.

If all these things are desirable, how are you going to get them? You know, of course, that there is a cattle commission and a railroad commission, and various other commissions in this State, and I suppose you have heard of the library commission. The library commission's first duty is to make books accessible, in a public way, to all the people in the state, and they have tried to do this in various ways. The first way was the establishment of public libraries in the state,—not particularly in the cities or villages, but way back in the little towns where the grand lists were very small. The commission needed help from the state, and to get this aid to establish libraries, laws were passed by which one hundred dollars' worth of books could be given to any town which would vote to appropriate a certain percent toward establishing a library. In the smallest town it was $15, in the next size towns $25, and in the largest $50. Over one hundred libraries have been established by this method, but this did not seem to entirely fill every want. So after a little the commission adopted the scheme of having books which they loaned to towns. This was called the "travelling library" system. If some one lived

way back in a little town and wanted something to read, there was nothing to prevent his having it, for if he sent word to the commission, a blank was sent to be signed by three people saying they would be responsible for the books, and that the express would be paid both ways. The commission succeeded in getting a half-rate on return express charge, which means that for about $1.50 expressage a year people can get about all they want to read. These books were selected with a view to meeting the wants of every one, both young and old, and numbered about 45 books in each case, some fiction and some non-fiction. These travelling libraries have been found to be exceedingly well used, and many towns that have had them say they could not get along without them. Sometimes, after they have had these libraries, they want to form a town library and then they give up the travelling library and get some books of their own which will remain in the town.

Then, too, collections were made which were adapted to schools. If Miss Smith is teaching in a way-back country school and wants something to help her about her geography or history, she has only to ask for one of these school libraries and it will be sent her at once, and at the end of six months the books may be returned and another set of books sent which will be entirely different and yet meet the needs. Twice a year these books have been sent to stations.

It sometimes happens that somebody feels the need of books on a special topic. One of your speakers asked for a book on a particular subject, and by sending in and specifying his wants, the commission was very glad to send him such books as they had on that subject. It has been found that this proved a most satisfactory way, so very satisfactory that the library commission is having hard work to keep up with the demands to supply all the books they are asked for.

Then there's another way. If you have a library already in your town, you should make use of that. I find there are many towns where farmers say they have a library, but it does not trouble them very much. If you have a library that is not open enough of the time to suit you, why do you not change it? You are the ones who have the power of voting to change things. In order to encourage this, the state library commission had a law passed last session by which annual aid of books could be given to those small towns whose libraries were open more than once a week and made good use of the books they already had. There were many places like that in the state, and the commission proposes to have these people divide up their books and send them around. Why should one corner of your town have all the privileges and the other corner be deprived from reading? There are towns that have such a high mountain in the middle that every one has to live in the edge of the town. Then there is another town where it is almost impossible for the people in one part of the town to get near the people in the other part. When there are

circumstances like that the only way to solve this library problem is to see that the books are sent around or to have branch stations established. If your town has a library and there are no branches, it is for you to see that you get those books, because they belong to you. If the library of your town makes good use of the books it already has, it may continue to receive aid from the state each year. If you have a school district in your town which is not getting all the books you wish, just say something about it. See that something is moved so that every child in your town can get those books which he needs and ought to have. If there are books which are called for and the library or library commission does not have them, we have arrangements whereby we can borrow them. New York state has 90,000 volumes and can not circulate more than 45,000 of those, so that they can loan us some, and if we are not able to supply all that you want we will send to Albany or Boston, or Connecticut, or Northampton, Massachusetts, and borrow them. No one need go without books in this state if he will make his or her wants known.

In closing I want to read this quotation from Channing: "God be thanked for books. They are the voices of the distant and the dead, and make us heirs of the spiritual life of past ages. Books are true levelers. They give to all who will faithfully use them, the society, the spiritual presence of the best and greatest of our race. No matter how poor I am, no matter though the prosperous of my own time will not enter my obscure dwelling, if the sacred writers will enter and take up their abode under my roof, if Milton will cross my threshold to sing to me of Paradise, and Shakespeare to open to me the workings of the human heart, and Franklin to enrich me with his practical wisdom, I shall not pine for want of intellectual companionship, and I may be called a cultivated man though excluded from what is called the best society in the place where I live."

THE NEW ENGLAND CORN SHOW.

N. H. BREWER, PRESIDENT OF THE NEW ENGLAND CORN SHOW.

Many farmers are becoming interested in the growing of grain and corn. In the last twenty-five years the price of corn has not only doubled, but the consumption of corn in New England, for feeding purposes and domestic use has also doubled. We imported

this last year 11,000,000 bushels from the West. There is no reason why these 11,000,000 cannot be grown in New England.

The Fruit Show held in Boston in October, 1909, was the biggest success of that kind ever held this side of the Mississippi. When the Fruit Show was started a Corn Exposition was suggested, the two to be held jointly. It was feared, however, that if held in connection with the Fruit Show it would be detrimental to both, and it was decided to hold the Fruit Show in 1909 and the Corn Exposition in 1910. At this time we formed a corn propaganda and many of you know the work it did this last year. Through Connecticut we sent out circular letters to all the fair managements and asked them to donate prizes liberally at their agricultural fairs, and the result was that we had twice as much corn exhibited as in any year previous.

The officers of the corn propaganda consisted of a president, N. Howard Brewer; vice-president, G. C. Sevey; and secretary, Prof. W. D. Hurd. There was a vice-president and secretary appointed in each of the New England States. This propaganda, at the time of the Fruit Show, organized into the New England Corn Exposition, and the officers were made permanent officers of the Exposition.

An exposition is to be held in Worcester in November next, at which time a general round-up of all the corn growers in New England will occur. A full line of food products will be shown of which there are manufactured in New England today 127 different varieties. There is one company that alone manufactures about 100 kinds, and they want to put in a full representative line of their goods. Many of the state colleges will make educational exhibits representative of the different lines of work they are doing. Each state exhibit will be so located that the corn from that state will be exhibited in front of the booth. A section will also be devoted to different lectures. We want to make this exposition as educational as possible.

I have attended the three national corn expositions. The first was in Chicago, October, 1907, the second and third in Omaha, Neb., in December, 1908 and 1909. Five states had educational exhibits in 1907, but there was a lot of corn shown and the exposition offered very liberal premiums. The small grains were also shown in 1908 and fourteen states were represented. Twenty-six states were represented in 1909 and the small grain exhibits were rather ahead of the corn exhibits. There were about 10,000 exhibitors at the last exposition, and it was fairly well demonstrated that New England can grow just as good corn as can the West.

The premiums at this New England show are going to be very liberal. New England is divided into zones: Southern, South Central, Northern, and North Central. The Southern Zone consists of Connecticut, Rhode Island, and Plymouth, Bristol, Dukes and Nantucket Counties in Massachusetts. The South Central Zone consists of Massachusetts, except the counties

mentioned in the Southern Zone. The Northern Zone consists of all the counties in New England north of those included in the North Central Zone. The North Central Zone consists of Rutland Windsor, Bennington and Windham Counties in Vermont; Sullivan, Merrimac, Belknap, Strafford, Cheshire, Hillsboro, and Rockingham Counties in New Hampshire; York, Cumberland, Androscoggin, Sagahoc, Lincoln and Knox Counties in Maine.

We have offered about $5,000 in prizes. Through the implement and fertilizer dealers we have raised over $2,500 to be awarded in prizes. We want to encourage some of our younger farmers, and so have offered prizes for the best acre of corn grown by any boy under sixteen years of age. Miss Anna Barrows will conduct the domestic science school and demonstrations will be given in cooked food products of corn. The city of Worcester has contributed $1,250 towards the running expenses, and there are several other special premiums being encouraged.

We hope to have a full line of farm machinery in operation. It has been suggested that the fair-ground buildings where the exposition will be held be heated by furnaces. A big furnace manufacturing concern in Worcester advertises its furnaces by placing them around in the different buildings, with a full line of pipes, so that people can see the different forms of heating apparatus manufactured in Worcester. This same idea was carried out in Omaha.

Now in regard to the selection of corn to be sent as samples. The whole success of the exposition depends upon the proper selection of fields, the seed, and the preparation of the seed bed. If one has the very best possible seed that can be bought and plants it on a poorly prepared seed bed, a successful outcome is not likely to be attained. If one prepares a seed bed and plants poor seed, one will not get good results. Seed selection is a prime essential. The old-time method has been to pick out the seed corn from the crib in the spring. We picked out the heaviest ears and planted them and got an average crop; but it has been clearly demonstrated that if we make our selection in the fall and carefully dry the seed, our yield will be increased from five to twenty-five bushels per acre. If we go into the field and select the productive ear from the productive hill we can still greatly increase our yield. Naturally the best-looking ears, when you select from the crib, are those grown in places where the corn was favored by not being thickly planted. In order to select the best seed corn, from the time he begins husking his crop, the farmer wants to be on the lookout for the best-looking ears—those which are going to win his prizes at the show, and these ears are the ones which are going to give him the most yield the year following. I pick out the kind of stalks and ears I want for my field next year and husk the ears I want and keep them protected during the winter, and when those ears are all laid out before me I determine the type of corn I want, and during the

harvest I pick out that type of corn, and from the corn which I exhibited at different fairs I was able to pick out a ten-ear sample of just the kind I wanted to plant in the future. After the man has selected a ten-ear sample it should be dried to within five or six percent of moisture. If corn is sent to a show and is not thoroughly dryed and has become limber, it is discarded. Prize corn is picked out for the best possible seed corn.

In the preparation of small grains the grain should all be dust clean and free from weed seed. This can be done by the different fanning mills. Each sample should be pure, because a judge taking up a sample of grain in his hand and finding any mixture, will discard it.

The man who won the highest prize last year at the National Corn Exposition had about 8,000 bushels. He was just starting in to select corn to sell for seed purposes, and in running over his crop he thought he would send an exhibit to Omaha. He picked out his best ten ears from that 8,000 bushels, sent them and won the corn champion sweepstakes.

The railroads, the Boston & Maine, New York Central and New York, New Haven & Hartford, will have special cars for transporting to Worcester the ten-stalk exhibits which are to be sent. They are willing to put on these special cars and are going to donate quite a sum of money.

We want to have the support of every farmer in New England. If it is not possible for a farmer to go himself, he should talk about the exposition and encourage his neighbors to go.

PRELIMINARY PREMIUM LIST OF NEW ENGLAND CORN EXPOSITION.

(With reference to Vermont and New England as a whole.)

S. A. NOTT.

CLASS A. TEN-EAR SAMPLES.

Open to North Central Zone only. This zone consists of Rutland, Windsor, Bennington, and Windham Counties of Vermont; Sullivan, Merrimac, Belknap, Strafford, Cheshire, Hillsboro, and Rockingham Counties of New Hampshire; York, Cumberland, Androscoggin, Sagnahoc, Lincoln, and Knox Counties of Maine.

Class	A	3	Lot	1	Premium No.	17	Best 10 ears Yellow Dent.
				2		18	Best 10 ears White Dent.
				3		19	Best 10 ears 8 rowed Yellow Flint.
				4		20	Best 10 ears 12 rowed Yellow Flint.
				5		21	Best 10 ears White Flint.
				6		22	Best 10 ears Flint other than Yellow or White.
				7		23	Best 10 ears Sweet Corn.
				8		24	Best 10 ears Pop Corn.

Prizes on each of the above classes: First, $5.00. Second, $3.00. Third, $2.00.

Open to the Northern Zone only. This zone consists of all the counties in New England north of those mentioned in the North Central Zone.

Class	A	4	Lot	1	Premium No.	25	Best 10 ears Yellow Dent.
				2		26	Best 10 ears White Dent.
				3		27	Best 10 ears 8 rowed Yellow Flint.
				4		28	Best 10 ears 12 rowed Yellow Flint.
				5		29	Best 10 ears White Flint.
				6		30	Best 10 ears Flint other than Yellow or White.
				7		31	Best 10 ears Sweet Corn.
				8		32	Best 10 ears Pop Corn.

Prizes on each of above: First, $5.00. Second, $3.00. Third, $2.00.

Open to Vermont only.

Class	A	8	Lot	1	Premium No.	57	Best 10 ears Yellow Dent.
				2		58	Best 10 ears White Dent.
				3		59	Best 10 ears 8 rowed Yellow Flint.
				4		60	Best 10 ears 12 rowed Yellow Flint.
				5		61	Best 10 ears White Flint.
				6		62	Best 10 ears Flint other than White or Yellow.
				7		63	Best 10 ears Sweet Corn.
				8		64	Best 10 ears Pop Corn.

Prizes on each of above classes: First, $5.00. Second, $3.00. Third, $2.00.

Open to North Central Zone only.

Class	B	3	Lot	1	Premium No.	89	Best single ear Yellow Dent.
				2		90	Best single ear White Dent.
				3		91	Best single ear 8 rowed Yellow Flint.
				4		92	Best single ear 12 rowed Yellow Flint.

Prizes on above classes: First, $3.00. Second, $2.00. Third, $1.00.

Open to Northern Zone only.

Class	B	4	Lot	1	Premium No.	93	Best single ear Yellow Dent.
				2		94	Best single ear White Dent.
				3		95	Best single ear 8 rowed Yellow Flint.
				4		96	Best single ear 12 rowed Yellow Flint.

Prizes on above classes: First, $3.00. Second, $2.00. Third, $1.00.

STATE PREMIUMS.

Open to Vermont only.

Class B 8	Lot 1	Premium No. 109	Best single ear Yellow Dent.
	2	110	Best single ear White Dent.
	3	111	Best single ear 8 rowed Yellow Flint.
	4	112	Best single ear 12 rowed Yellow Flint.

Prizes on above classes: First, $3.00. Second, $2.00. Third, $1.00.

CLASS C. GRANGE EXHIBITS.

Open to Vermont only.

Class C 4	Lot 1	Premium No. 127	Best 80-ear exhibit Dent Corn.
	2	128	Best 80-ear exhibit Flint Corn.

Prizes for above classes: First, $25.00. Second, $15.00 Third, $10.00.

CLASS D. TEN-STALK EXHIBITS.

Open to North Central Zone.

Class D 3	Lot 1	Premium No. 139	Best 10-stalk exhibit Dent Corn.
	2	140	Best 10-stalk exhibit Flint Corn.
	3	141	Best 10-stalk exhibit Sweet Corn.

Prizes on above classes: First, $15.00. Second, $10.00. Third, $5.00.

Open to Northern Zone.

Class D 4	Lot 1	Premium No. 142	Best 10-stalk exhibit Dent Corn.
	2	143	Best 10-stalk exhibit Flint Corn.
	3	144	Best 10-stalk exhibit Sweet Corn.

Prizes on above classes: First, $25.00. Second, $10.00. Third, $5.00.

CLASS E. TEN-EAR SWEEPSTAKES.

Open to New England.

Class E 1	Premium No. 145	Best 10 ears Corn (any type)	$25.00
2	146	Best 10 ears Dent Corn	10.00
3	147	Best 10 ears Flint Corn	10.00
4	148	Best 10 ears Sweet Corn	10.00
5	149	Best 10 ears Pop Corn	10.00

CLASS F. SINGLE-EAR SWEEPSTAKES.

Open to New England.

Class F	1	Premium No. 150	Best single ear Corn (any type)	$10.00
	1	151	Best single ear Dent Corn	5.00
	1	152	Best single ear Flint Corn	5.00

CLASS G. EIGHTY-EAR GRANGE EXHIBIT SWEEPSTAKES.

Open to New England Granges.

Class G	1	Premium No. 153	Best 80-ear exhibit Corn (any type)	$25.00
	1	154	Best 80-ear exhibit Dent Corn	10.00
	1	155	Best 80-ear exhibit Flint Corn	10.00

CLASS H. TEN-STALK SWEEPSTAKES.

Open to New England.

Class H	1	Premium No. 156	Best 10-stalk exhibit Dent Corn	$10.00
	1	157	Best 10-stalk exhibit Flint Corn	10.00
	1	158	Best 10-stalk exhibit Sweet Corn	10.00

CLASS I. TEN-EAR SAMPLES. JUVENILE CLASS.

Open to Vermont only.

Class I 4	Lot 1	Premium No. 171	Best 10 ears Dent Corn grown and exhibited by boy or girl under 16 years of age.
	2	172	Best 10 ears Flint Corn, grown and exhibited by boy or girl under 16 years of age.
	3	173	Best 10 ears Sweet Corn, grown and exhibited by boy or girl under 16 years of age.
	4	174	Best 10 ears Pop Corn, grown and exhibited by boy or girl under 16 years of age.

Prizes on above classes: First, $5.00. Second, $3.00. Third, $2.00.

SINGLE-EAR EXHIBITS.

Open to Vermont only.

Class I 7	Lot 1	Premium No. 195	Best single ear Dent Corn, grown and exhibited by boy or girl under 16 years of age.
	2	196	Best single ear Flint Corn, grown and exhibited by boy or girl under 16 years of age.
	3	197	Best single ear Sweet Corn, grown and exhibited by boy or girl under 16 years of age.
	4	198	Best single ear Pop Corn, grown and exhibited by boy or girl under 16 years of age.

Prizes on above classes: First, $5.00. Second, $3.00. Third, $2.00.

CLASS 18. BOYS' AND GIRLS' CLUBS EXHIBITS.

The State officers of the New England Corn Exposition are to look after the prizes for exhibits from Boys' and Girls' Clubs, for their respective States. Statements of prizes will be made in the full premium list later.

CLASS 19. COOKING DEMONSTRATIONS.

For the best 10 Corn Muffins made and cooked at the Exposition by a girl under 16 years of age.

First prize, $15.00. Second, $10.00. Third, $5.00.

CLASS J. BEST ACRES.

Plots to be grown under certain regulations to be stated later.

Class J 1 Largest yield from acre of Dent Corn grown in New England.

First prize, $50.00. Second, $30.00. Third, $20.00.

Class J 2 Largest yield of Flint Corn to the acre in New England.

First prize, $50.00. Second, $30.00. Third, $20.00.

Class J 3 Largest yield of Silage to the acre, grown in New England.

First prize, $50.00. Second, $30.00. Third, $20.00.

CLASS K. CORN FOR CANNING.

Class K 1 Lot 1 Premium No. 207 Best 10 ears seed Sweet Corn for canning purposes.

First prize, $25.00. Second, $15.00. Third, $10.00.

CLASS L. SMALL GRAINS.

Competition open to New England.

Class L	1	Lot 1	Premium No. 208	Best peck of Wheat grown in New England.
		2	209	Best 4-inch sheaf of Wheat grown in NewEngland.
	2	1	210	Best peck Oats grown in New England.
		2	211	Best 4-inch sheaf Oats grown in New England.
	3	1	212	Best peck of Barley grown in New England.
		2	213	Best 4-inch sheaf of Barley grown in New England.
	4	1	214	Best peck of Rye grown in New England.
		2	215	Best 4-inch sheaf of Rye grown in New England.
	5	1	216	Best peck Soy Beans grown in New England.
		2	217	Best 4-inch sheaf SoyBeans grown inNewEngland.
	6	1	218	Best peck of White Beans grown in NewEngland.
		2	219	Best peckYellowEyeBeans grown in NewEngland.
		3	220	Best peck Pea Beans grown in New England.
		4	221	Best peck Kidney Beans grown in New England.
	7	1	222	Best peck Vetch Seed grown in New England.
	8	1	223	Best peck Hungarian Seed grown in New England.
		2	224	Best peck Japanese Millet Seed grown in New England.

Prizes in each class to be: First, $5.00. Second, $3.00. Third, $2.00.

CLASS M. GRASSES AND FORAGE PLANTS.

Competition open to New England.

Class	Lot	Premium No.	
Class M 1	Lot 1	225	Best sheaf Timothy grown in New England.
	2	226	Best bale Timothy.
2	1	227	Best sheaf Red Clover grown in New England.
	2	228	Best sheaf Red Clover grown in New England.
3	1	229	Best sheaf Alsike grown in New England.
	2	230	Best bale Alsike grown in New England.
4	1	231	Best sheaf Crimson Clover grown in New England.
	2	232	Best bale Crimson Clover grown in New England.
5	1	233	Best sheaf Alfalfa grown in New England.
	2	234	Best bale Alfalfa grown in New England.
6	1	235	Best sheaf Hungarian grown in New England
	2	236	Best sheaf Japanese Millet grown in New England.
	3	237	Best sheaf Pearl Millet grown in New England.
7	1	238	Best collection of plants suitable for dairy soiling grown in New England.

Prizes in each class to be: First, $5.00. Second, $3.00. Third, $2.00.

CLASS N. SPECIAL PREMIUMS.

Bowker Specials:

The Bowker Fertilizer Co., 43 Chatham St., Boston, Mass., offers $1,000 in prizes.

One prize of $500 to be awarded for the largest quantity of water-free shelled corn obtained on an acre grown on Stockbridge Fertilizer.

Also, the grand sweepstakes prize of $500 for the largest crop of moisture-free shelled corn obtained from an acre grown on Stockbridge Fertilizer exclusively, which shows the greatest food value, not only by quantity, but also by quality, the quality being determined by analysis, and based on the amount of protein, carbohydrates, fat and mineral matter in the water-free grain; their relative feeding value to be judged by a scale to be established by Experiment Station experts and others.

The Kellogg Toasted Corn Flake Special.

Mr. W. K. Kellogg, President of the Kellogg Toasted Corn Flake Co., Battle Creek, Mich., offers a cash prize of $200 for the best ten-ear exhibit of White Corn grown in New England in 1910.

The Massachusetts Society for the Promoting of Agriculture Special:

The above-named organization offers cash prizes of $300 to be awarded on corn grown in New England in 1910. The distribution of the prizes is yet to be decided.

The Worcester Agricultural Society Special·

The Worcester Agricultural Society has voted to contribute $250 to be distributed later as special prizes.

CHARACTERISTICS OF IMPORTANT VERMONT TREES.

A. F. HAWES, STATE FORESTER.

I. CONIFERS.

WHITE PINE.

The white pine's natural range stretches from Newfoundland west to Minnesota, south into Iowa, Illinois and Ohio, and in the Appalachian Mountains to Northern Georgia and Alabama. Until recent times it has been the chief building timber of the country and until 1892, the amount of it cut in the lake states steadily increased. Since that time it has been growing more and more scarce and correspondingly expensive. In the original forests of New England it obtained a height of 200 feet, containing five or six thousand feet of lumber. It is seldom that trees are found today more than 120 feet high and four feet in diameter. I am told that in Weybridge, Vermont, there is a pine six feet in diameter. In this state the pine was an important tree of the forests in the Champlain and Connecticut valleys, and there are still remnants of it in these regions.

The white pine is less exacting, regarding soil, than almost any tree of the state and for that reason will grow well on the driest sand plain or in a comparatively wet, swampy place. It does best, however, on a gravelly loam soil which is fairly well drained. It is more particular regarding light, for while it will live for some time under considerable shade, it makes very little growth, and finally dies. There is a stand of 2,000 pines to the acre on a Connecticut sand plain where one-half the trees have died for lack of light.

It is a very rapid growing species, especially in second growth stands, where the rings often average one-fourth to one-third of an inch in thickness, and the height growth from one to three feet. Naturally it is long lived and few old specimens can now be found.

The seed years are rather infrequent, averaging from three to four years apart, but the trees often begin to seed before they

are twenty years old and bear heavy crops. Two or three bushels of cones to a tree are not uncommon. A bushel of cones will yield about a pound of seed of from 25,000 to 30,000 seeds to the pound. The seed is light and carried considerable distances by the wind.

The thin bark of the pine makes it very susceptible to damage from fire when it is young, but later when it becomes thickened it is fairly fire resistent. One of its greatest enemies is the white pine weevil, an insect which always kills the leader of the tree, and results in a crook in the stem. A few years ago the pine blight threatened to be serious, but lately it has nearly disappeared. It was evidently due to unfavorable weather conditions and not to any insect or fungus.

Second growth white pine is inferior to the old growth and is chiefly used for box boards and match stock.

RED OR NORWAY PINE.

This has about the same natural range east and west as the white pine, but only extends south through Pennsylvania. It derives its name from the fact that it was first noticed near Norway, Maine, and not from the European country, as neither this nor the white pine are native of Europe.

The demands of the red pine on soil, light, and moisture are about the same as those of the white pine. If anything it will grow on an even dryer sand, but is more exacting of light.

Measurements made in several New England plantations show an average height of 35 feet and six inches in diameter in 30 years. It seldom grows over 100 feet high or three feet in diameter, but in the West it reaches bigger size than in New England.

Its seed years are every two to four years, but the crop of cones is never as prolific as with the white pines, so seed is scarce, and reproduction is not usually very plentiful.

The tree is freer from diseases and suffers less from fire than the white pine. Its wood is more like that of the southern yellow pine, but is often classed in with the white pine, especially in the lake states.

RED SPRUCE.

This is the common spruce of Vermont. It is the most important timber of the state and grows from New Brunswick west through New York and south in the Appalachian Mountains to northern Georgia. The spruce is rather particular as to soil and will not do well on dry sand where white pine will thrive. Along with its demand for moisture is its ability to live under a dense shade and it grows naturally on the cool slopes and at higher elevations than the pine.

In old stands its growth is extremely slow, suppressed trees three feet high and fifty years old being not uncommon. However, where the spruce has come up in the open of an old field it often makes a growth of a foot to a foot and a half a year in height, and produces an average of a cord an acre per annum in a period of 30 or 40 years.

Its root system is very shallow and for that reason it is liable to be blown over by strong winds. Individual large spruce should never be left after cutting, but trees should be left in wind-firm clusters.

The seed years are more frequent than those of pine and as it also begins to seed before it is twenty years old, reproduction is good. Of course the seedlings growing out in the open will be limby, but if sufficiently close together these limbs will be killed off.

HEMLOCK.

Next to the spruce this is the most important timber of Vermont from the standpoint of production. From the Atlantic it extends west to Minneapolis and south into Georgia, a little farther than the spruce and reaches its best development in the southern Appalachians.

The hemlock is only a little more particular than the pine in regard to soil, as it will grow in very dry situations. It is rather a tree of the hillside than of the plain, however, and especially prefers cool glens or ravines, where it is usually mixed with other trees. It will stand a great deal of shade, even surpassing the spruce in this ability. It is slow growing and apt to become shaky as it grows old. The lumber is of inferior quality, but the bark which must be peeled in summer has an additional value for tanning purposes. The hemlock seeds practically every year and reproduction is good, but the seedlings grow slowly. The tree is free from diseases.

II. DECIDUOUS TREES.

MAPLE.

The Sugar Maple is the most important hardwood tree of Vermont, both on account of the amount of lumber produced and for its value in producing sugar. It is widely distributed over the eastern half of the country as far west as Dakota and Texas.

The maple is essentially a lime-loving tree and seldom does well on a sandy soil. It reaches its best development on moist, well-drained slopes and is naturally mixed with other species such as birch, beech and spruce. In most of our sugar orchards these other trees have been taken out. It will stand a great deal of shade; is comparatively slow growing, and lives to an advanced age of 300 or 400 years. The sugar maple is a prolific seeder, the seeds maturing in the fall while those of the red maple

mature in the spring. Along highways shaded by maples the ground is often covered with little maples which are later cut off with the grass. In the orchard these young maples are browsed off by cattle, and this is one of the chief forms of damage to the tree. If cattle are kept out the condition of the orchard may be maintained indefinitely.

The maple sometimes suffers severely from defoliation by the forest trees caterpillar, resulting in injury to the sap and often in the death of the tree. Another common insect enemy is the maple borer, which makes great sores on the trunk. In exposed situations sores are sometimes caused on the south side of the tree by sun scald, but these lack the borings which characterize the work of the borer. The thick bark protects the tree fairly well from fire damage.

YELLOW BIRCH.

This is the most important birch of the country. The so-called red birch of the trade is made from the heart wood of this tree. It extends from the Atlantic west into Minnesota and south in the southern Appalachians to northern Georgia.

While the birch is less exacting as to soil than the maple and often occurs perched up on a rock, it will not stand as much shade as the maple. Grown in the open space caused by a forest fire or an old lumber cutting, it makes a fairly rapid growth, but mixed in an old forest with maple and beech, its growth is as slow as theirs, and it lives to the same old age.

The birch has a good seed crop every year and the seed is extremely light so that it is carried long distances by the wind, which accounts for its presence in openings far from seed trees. It has few enemies, and while the shredded outer bark is easily burned, the tight inner layers protect it from serious damage except in case of very hot fires.

BEECH.

The beech is widely distributed over the eastern half of the country as far west as Wisconsin and eastern Texas. In our forests it usually occurs mixed with the maple and birch. Like the maple it prefers a soil rich in lime and does little on sand. It will stand even more shade than the maple.

The growth of beech is very slow and its length of life is about equal to that of birch and maple. Grown in the forest it forms a clear straight trunk. It is one of our most beautiful trees, yet the inferior quality of its lumber places it among our weed trees.

Its seed years are few and far between, and the nuts cannot be scattered any distance except through squirrels and other animals. The beech has, however, the ability to send up succors

from its roots and it is due to this that there are usually clumps of young beech trees around old trees. This is especially so in southern New England.

The tough smooth bark of the beech enables it to resist fire very well and it has few enemies.

WHITE ASH.

The white ash is our most valuable deciduous tree. It occurs throughout the eastern half of the country, west into Nebraska, and Texas, and south into Georgia and Mississippi.

The white ash usually occurs as individual trees mixed in with other trees, seldom forming a large proportion of the stand. It prefers a moist loam soil and is almost never found on dry sandy sites. It also requires considerable light and, when favored with good light and soil, makes a fairly rapid growth.

The ash seeds nearly every fall, but some years more heavily than others. The seed has a long wind and is carried considerable distances and reproduction is usually good in the vicinity of old trees. One of the chief aims of forestry in Vermont should be to assist the seeding of this tree.

It has few serious natural enemies, although often covered with the oyster-shell-bark louse.

BASSWOOD.

The range of the basswood is practically the same as that of the white ash. It is also similar to ash in its requirements, as to a good moist soil and plenty of light, although it will survive in comparatively dry situations. It makes a fairly rapid growth and consequently seldom reaches advanced age before becoming decayed in the center.

The seed has a wing which carries it some distances, and the tree has the further advantage of being a prolific sprouter. If the old trees are cut in the winter a number of sprouts will grow from the stump and, consequently, clumps of basswoods are common.

It is little troubled by insects, but is easily damaged by fire. Its wood is light, straight grained and easily worked, giving it a demand for many purposes.

POPLAR.

There are two or three species of poplar which have wide range over the country, and have similar characteristics, but which would not be confused with the yellow poplar of the south which is quite a different tree.

The poplar is not at all fastidious about soil, except that it usually occurs in rather dry situations. It is common on the

sand plains of the Champlain valley and on the dry burned-over slopes of the mountains. It is, however, very exacting about light and will not endure much shade at any time.

Poplar is noted for its rapid growth and short life. It is usually infested with a fungus by the time it is forty and begins to die at the top. The seed which ripens in the early summer is the lightest of all forest seed and is carried long distances by the wind, so that with the birch it is usually the first tree to come up after a fire regardless of the proximity of seed trees. Besides the fungus above referred to, it is greatly damaged by fires.

In Vermont poplar is made into lumber and also used for pulp. There is a great deal of young poplar in the state which will be of importance during the next thirty years.

TIMBER ESTIMATING.

A. F. Hawes, State Forester.

Methods of timber estimating are numerous and of varying degrees of accuracy. The kind of method which should be employed will depend very largely upon conditions. It would be impracticable, for example, to estimate the timber on a ten thousand acre tract with the same degree of accuracy that could be employed on a fifty acre piece. Neither is there the same need of exactness in estimating timber on a large tract that there is on a small one. Usually large tracts which are bought or sold do not have a very heavy average yield per acre, and they are situated in remote regions where the stumpage price is comparatively low. Many small tracts, on the other hand, are worth over $100 an acre, either on account of heavy yield or proximity to the market. Naturally one would employ more exact methods of estimating the stand on a fifty acre tract priced at $5,000 than on a ten thousand acre tract valued at $100,000.

METHODS APPLICABLE TO LARGE TRACTS.

Estimating lumber is like every other business. The more experience a man has in it, the more accurately he can estimate and the simpler the methods he can use. Many lumbermen or more correctly, timber cruisers, can go over a large tract in a casual way and estimate fairly accurately the total amount of timber upon it. They are able to do this because they have had experience in cutting off many similar tracts, and know the

amount of lumber taken from them. The roughest method is simply to compare in one's mind the tract under consideration with those with which one has had experience. Stumpage prices of timber have now advanced so much and competition is so great, that practically all cruisers now use some definite system.

It should be said at the outset that the land owner or prospective purchaser can usually secure the services of one of these cruisers but, as the business offers unequalled opportunity for dishonesty, the employer should be sure that the estimator is working in his interests. It must also be borne in mind that most of these men look at the forest from a lumberman's, rather than a forester's, view point and are, therefore, not inclined to place much value on young growth, or to appreciate the probable rise in prices. For these reasons they are more apt to underestimate than overestimate and their judgment is worth more to the purchaser than the seller.

As the purpose of this chapter is to point out methods of estimating which can be applied by one of little experience, rather than to describe the cruisers' methods, the latter will be omitted. The basis of any method of estimating must be a knowledge of the actual area under consideration and as most forest tracts are made up of several different types or age classes, the areas of each one of these portions should be known. For example, on a ten thousand acre tract in northern New England it might be found that 2,000 acres were second growth pine on plain land; 1,000 acres abandoned pasture; 4,000 acres mixed birch, beech and maple, from which the soft woods have been culled, and 3,000 acres second growth spruce on the hill tops. Of course each of these blocks would have to be estimated separately. There might also be subdivisions according to age, which would better be estimated separately. Thus, suppose in the old pasture land 300 acres are covered with gray birch cordwood, and that there are burns in the hardwoods aggregating 500 acres which are covered with pin cherry, paper birch and poplar.

Of course the only accurate way to determine these areas is to map them and, consequently, a rough map is usually made by the estimator as he goes through the forest,* while in an open country such as much of the western forest, it is undoubtedly better to map the area first with a plane table and do the estimating separately. There can be no question that for most of our New England forests the so-called "Strip System," or "Valuation Survey," devised by the U. S. Forest Service, is unsurpassed. To carry out this method a crew of four men is best, although it can be done with three. The necessary equipment is a surveyor's chain, hand compass (for more accurate work, a staff compass), two pairs of calipers, a tally board and

*For information about mapping forests, see "A Manual for Northern Woodmen" by Austin Cary. Published by Harvard University, Cambridge, 1909.

sheets and a pencil. An hypsometer is a valuable addition as will be explained later. The crew may be arranged in various ways. The main object is to run a straight compass course through the forest, and this can be done, either by the headman, who has the chain attached to his belt, or by the tallyman who stops the chain and can direct the headman to go either to the right or left. The other two men carry the calipers and measure the diameters of all trees for a distance of one-half chain length on either side. At first this distance should be checked by frequently carrying the chain out to the side or by pacing, but with practise the men soon get so they can judge very closely and the few inaccuracies balance themselves. As the trees on this strip 66 feet long and 66 feet wide are calipered, their diameters are called out thus: Spruce, 6; birch, 8; maple, 7, twice; etc., and are tallied by the fourth man thus:

D. B. H.*	Spruce	Birch	Maple	Beech	Hemlock	Others
4						
5						
6						
7						
8						
9						
10						
11						
12						

This square of 66 feet each way is one-tenth of an acre. When all the trees on this area have been measured, the crew moves on another chain in the fixed compass direction. The chains are tallied after moving forward just as the number of trees. Ten chains completes the acre, which is all that is tallied on one sheet. A description of the forest is written on the back of the sheet with special reference to the type so that all acres measured in a definite type can be averaged together. If there

*D. B. H. stands for diameter breast high at which height all trees are calipered.

is a marked change in type in the course of an acre, it is better to start a new sheet; the tally of chains showing that this sheet represents .6 or .8 of an acre. A continuous strip of eight acres covers a mile of distance: 66x10x8 = 5,280 feet. Usually after running a straight course in one direction for half a day, the crew returns on a parallel course a fixed distance from the first. The distance apart of these lines depends upon the intended accuracy of the estimate. Lines run one mile apart give a measurement of 1.2% of the entire area; ½ mile apart 2.5%; ¼ mile apart 5%; ⅛ mile 10%, etc. However, in practice the lines are never run nearer than ¼ mile and usually 2.5% of the area is considered sufficient. By making note of changes of topography, brooks, etc., it is possible to make a fairly accurate map of the area covered at the close of the day or week; and the areas of the different types can be determined from this map. Along with the survey the crew should take the height measurements of a few hundred trees of the most important species, so that it will be possible to obtain the average height for each diameter class. The hypsometer makes it a very simple operation to take these heights. Of course it is quite possible after a little practise to estimate heights very closely.

When all the required valuation surveys have been secured there is still a good deal of work to be done. In the first place, the tally sheets are assorted according to the type of land they represent. Supposing that of the 500 acres measured in the ten thousand acre tract 100 will fall into the second growth type; 150 in mixed hardwoods; 200 in second growth spruce, and 50 in abandoned pasture.

After grouping the sheets in this way there are two ways of computing the results. Both rely upon so-called Volume Tables.* Volume Tables have now been constructed for most of our important trees. They are based on the measurements taken in lumber jobs of several hundred trees and give the average volume either in board feet or cords of trees of different diameters and heights. In the case of some trees for which no volume tables have been constructed, tables made for similar formed trees may safely be used.

The first method of computing the total stand on a type is to compute separately the total stand on each acre measured, as shown in the following table.

* A number of these tables are included at the end of this article.

STAND ON ACRE NO. 1.

D. B. H.	White Pine			Spruce.			Poplar.		
Inches	No. of trees	Vol. per tree Bd. ft. Table 1	Total volume Bd. ft.	No of trees	Vol. per tree Bd. ft. Table 2	Total volume Bd. ft.	No. of trees	Vol. per tree Bd. ft. Table 6	Total Volume Bd. ft.
5	17	10	170						
6	8	20	160						
7	9	30	270	14	18	252	12	15	180
8	3	50	150	13	38	494	4	33	132
9	10	60	600	8	61	488	2	48	96
10	4	95	380	5	78	390			
11	1	145	145				1	91	91
12									
13	6	190	1,140						
14				2	172	344			
15				1	195	195			
			3,015			2,163			499

When each acre has thus been computed the total amount of each species for all the acres measured in the type is secured. Knowing the percentage which this number forms of the total area of the type, it is easy to ascertain the total amount of lumber on the type. If it was found that there were 50,000 feet of spruce on 2.5% of the area, the total amount would be 2,000,000 feet.

The same process is, of course, repeated for the other types, and when completed the total stand for the whole tract is found by adding together that of the different types.

Another easier, though less accurate way of determining the volume of the type in the office, is to first construct the average acre by determining the average number of spruce trees 5, 6, 7 and 8, etc., inches in diameter. When the average number of trees of each diameter and species for the type has been obtained the volume table is applied as in the previous case and the total volume of each species is then multiplied by the total number of acres in the whole type.

In the application of volume tables it will be seen that some give cubic feet instead of fractions of a cord or board feet. The number of cords can be secured by dividing the number of cubic feet by 90 on the principle that a cord of wood (128 stacked cubic feet) contains 70% solid wood which amounts to 89.6 cubic feet. Board feet can be safely converted to cords by allowing 500 board feet as the equivalent of a cord. This varies from 400 feet for small logs to 600 feet for large ones and it must be remembered that the rule will not always work backwards, for a cord of wood may be composed of small sticks that could not be sawed.

The valuation survey method of estimating, described above, undoubtedly combines accuracy and cheapness better than any other method. There are now forestry companies whose

main business it is to estimate timber by this method. Appleton at Bangor and Viles at Augusta, take contracts for doing this work on a large scale at from 6 to 7 cents an acre. With the estimate they make a map with 50 foot contours, locating camp sites, streams, etc.

The chief disadvantage of this method is the number of men required and the difficulty experienced sometimes in securing reliable assistance. The work is useless if carried on in a dishonest or careless way, and often there is great temptation to omit trees on the edge of the strip, or to guess at diameters instead of measuring them.

A method which can be applied by one man must necessarily rest on pacing off the distance instead of chaining it. The estimator should first determine the average length of his pace, so that at the end of 100 paces he will know whether he has covered 270 or 300 feet. With a hand compass he takes a straight course through the forest for a certain distance, as one quarter mile; he then lays out a circle by pacing off in different directions from the determined center. A radius of 60 feet makes one quarter acre; and a radius of 85 feet makes one half an acre.

Various methods of determining the stand on this area may be used.

(*a*) All the trees may be calipered and tallied as in the strip system, and the volumes determined later from a volume table.

(*b*) The diameters may be estimated and tallied. This saves considerable time and a man of experience can estimate diameters very accurately.

(*c*) The diameter may be estimated and the volume tallied direct from a volume table carried in the woods. In this way the total stand of the plot may be determined on the spot.

(*d*) After much practice, the volume of each tree may be estimated without the use of volume tables. By pacing but one radius and carrying the other radii in one's mind, it is possible by this method to cover considerable country in a day.

Of course the types and important features are mapped by the man pacing just as they are mapped by the crew of the strip survey.

The average volume of each species for the plots covered is multiplied by the total area of the type represented, as by the other method.

ACCURATE METHODS APPLICABLE TO SMALL AREAS.

On small areas there is often a very valuable growth which requires more accurate methods of estimating than could be used for large tracts, such as have been described above. Then, again, for scientific purposes it is often necessary to determine the

contents of a stand exactly as when we wish to determine the increment for a definite period.

The basis of this work is securing a number of plots representing very carefully the different types. Of course the greater the number of these plots the more accurate the estimate. When all the trees on the plot have been calipered as in the strip survey, there are several methods of determining the volume.

One of these called the "mean sample tree method" relies, as its name implies, on cutting down one or more trees of the average diameter and carefully securing the contents of these trees. This is obtained by adding together the volumes of the various logs computed on the formula $V=\frac{A+a}{2}\times L$. Where V = volume; A = area at base of log; a = area at top of log and L = length. The average volume of these sample trees is multiplied by the total number of trees on the plot to obtain the total volume. This method is only satisfactory where the diameters do not vary much. It can be safely used in most second growth, even aged, stands.

Where there is a wide range of diameters it is customary to divide them into groups and cut sample trees for each group instead of for the whole stand. Hence this is called the Arbitrary Group Method. Any number of diameters may be classed together as those from 4″–8″; 9″–12″; 13″–16″; 17″–20″, etc. Of course this method requires the cutting of more sample trees and if it is difficult to find trees of the correct diameters in the plots, it is admissible to cut them outside, provided they have grown under similar conditions and have the same form.

There are several modifications of this system based on the theory that the number of sample trees cut for a group should be proportional to the number of trees in the group, but this is not important for practical purposes. It must be remembered for scientific purposes that the volumes of trees are proportional to their cross sections or the squares of their diameters and not to their diameters. So the mean trees are secured by averaging basal areas instead of diameters. For practical purposes, however, it is sufficiently accurate to average diameters.

The volume curve method is one that is easier to apply and has the advantage that it gives the volumes of each diameter class separately. A few sample trees are cut and measured, without regard to their exact diameters only being careful to represent the range of diameters fairly well. Their volumes are plotted on cross section paper and a curve is plotted from which volumes are read for each diameter class. In other words, a simple volume table is made for each plot.

Of course where local volume tables exist their use would give the best results, but it is probable that either of the last two methods would give a more accurate estimate than could be secured by the use of a volume table made for some other region.

In small woodlots up to 100 acres, worth over $50 an acre, every tree should be measured.

TABLE I.

WHITE PINE.

Volume Table, in Board Feet, for White Pine, in Massachusetts. Scaled by rule made from mill tallies. Volume up to four-inch top. Stumps taken at one-half foot.

Diameter breast high.	TOTAL HEIGHT (FEET). 30	40	50	60	70	80	90
Inches.	Bd. Ft.	Bd. Ft.	Bd. Ft.	Bd. Ft.	Bd. Ft.	Bd. Ft.	Bd. Ft.
5	10						
6	15	20	30				
7	20	30	40	50	65		
8	25	35	50	65	85		
9	30	45	60	80	105	115	
10		55	75	95	125	145	
11		65	90	115	145	170	200
12		75	105	135	165	200	230
13		90	120	155	190	235	260
14			135	175	215	265	300
15			155	195	245	300	340
16			175	215	270	335	380
17				240	300	370	420
18				260	325	405	465
19				280	355	445	510
20				305	385	485	555
21					420	525	605
22					450	570	650
23					480	620	700
24					515	665	750
25					550	715	800
26							855
27							905

TABLE II.

SPRUCE.

VIRGIN SPRUCE SLOPE.

Woolsey. New Hampshire. Basis 411 trees. New Hampshire rule.

Diameter breast high. Inches.	TOTAL HEIGHT (FEET). 40	50	60	70	80
	CONTENTS IN B. M. FEET TO SIX INCH TOPS.				
7	15	25	30	35	
8	29	38	45	53	
9	42	53	61	71	
10	58	67	78	91	
11	76	84	94	110	
12	96	100	112	130	
13			130	151	
14			148	172	194
15			166	195	219
16			186	219	245
17			208	244	275
18				272	305
19				308	343
20				346	400

TABLE III.

SPRUCE.

Woolsey. Old Field Spruce. New Hampshire rule.

New Hampshire.

Basis 579 Trees.

Diameter breast high. Inches.	TOTAL HEIGHT (FEET). 40	50	60
	CONTENTS IN B. M. FEET TO SIX INCH TOP, D. O. B.		
7	18	27	28
8	30	37	44
9	42	50	59
10	55	65	76
11	68	80	93
12		96	111
13		113	129
14		129	148

If cut to 4 inch top, trees under 10 will scale about 10% more; those over 10 inches about 1% more.

TABLE IV.

POPLAR.

Tower. Volume B. M. Maine.

TOTAL HEIGHT (FEET).

Diameter breast high	40	45	50	55	60	65	70	75	80	85
Inches.	Bd.Ft.	Bd.Ft.	Bd.Ft.	Bd.Ft.	Bd.Ft.	B.Ft.	B.Ft.	B.Ft.	B.Ft	B.Ft.
7	10	15	20	26	33	41				
8	20	26	33	40	47	55				
9		34	42	48	56	65	76			
10			50	57	66	75	85	95		
11				72	81	91	102	115		
12				84	95	108	123	140		
13						130	147	170	191	
14						155	173	198	225	252
15						187	212	238	268	301
16						222	248	275	306	345
17							290	318	350	383
18									368	400

TABLE V.

POPLAR.

Tower. Basis 238 Trees. Maine.

Volume in Cords of Pulp.

TOTAL HEIGHT (FEET).

Diameter breast high	40	45	50	55	60	65	70	75	80
Inches.	Cords.	Cords.	Cords.	Cords.	Cords.	Cords.	Cords.	Cords.	Cords.
5	.029	.030	.034						
6	.037	.040	.044	.052	.054				
7	.046	.052	.054	.066	.070	.083			
8		.072	.074	.087	.078	.106			
9			.096	.104	.118	.124	.144	.151	
10			.121	.128	.147	.153	.176	.184	
11				.150	.165	.178	.223	.233	
12				.182	.200	.215	.251	.253	
13						.260	.283	.300	.324
14						.303	.329	.347	.374
15						.350	.370	.401	.414
16						.407	.433	.468	.475
17							.484	.533	.539
18									.606

TABLE VI.

YELLOW BIRCH.

Squaw Mountain Township,
Piscataquis County, Maine.

Hosmer. Bangor

Diameter breast high Inches	Volume. Board Feet.	Basis. Trees.
10	33	1
11	62	2
12	92	9
13	121	10
14	147	19
15	172	16
16	197	16
17	225	22
18	250	17
19	303	15
20	347	14
21	385	10
22	413	1
23	438	3
24	461	2
		157

TABLE VII.

YELLOW BIRCH.

Herkimer and Lewis Counties, N. Y.

Cheever.

R. R. Ties. 7″ x 9″ x 8′

Diameter breast high Inches.	Volume. Ties.	Basis Trees.
12	1	
13	1	9
14	2	23
15	2	31
16	3	57
17	3	58
18	4	91
19	4	102
20	5	86
21	5	76
22	6	81
23	6	62
24	7	61
25	7	60
26	8	42
27	8	41
28	9	30
29	9	16
30	9	16
		941

TABLE VIII.

BEECH.

Squaw Mountain Township,
Piscataquis County, Maine.

Hosmer. Bangor

Diameter breast high Inches.	Volume. Bd. Ft.	Fraction of Cord.	Basis Trees.
10	57	.16	1
11	76	.18	9
12	95	.21	22
13	114	.25	28
14	134	.29	25
15	156	.33	14
16	180	.36	7
17	207	.39	7
18	235	.42	3
19	264	.45	
20	296	.48	
21	328	.51	
22	360	.54	
23	393	.51	
24	425	.60	
			116

TABLE IX.

BEECH.

Herkimer and Lewis Counties, New York.

Waha.

Diameter breast high Inches.	Volume Ties.	Basis Trees.
12	1	2
13	2	14
14	3	63
15	3	66
16	3	68
17	4	66
18	4	60
19	5	39
20	6	39
21	7	27
22	7	12
23	8	12
24	9	10
25	10	1
26	11	3
27	11	1
28	12	
29	13	2
30	14	
		485

TABLE X.

SPRUCE IN CORDS.

This table may be used for balsam fir, but in general with some deduction.

Diameter breast high. Total Height of Tree—Feet.

Inches.	40	45	50	55	60	65	70	75	80
6	.04	.05	.05	.06					
7	.06	.06	.07	.08	.09				
8	.07	.08	.09	.10	.12	.13			
9	.09	.10	.12	.13	.14	.16			
10	.11	.12	.14	.16	.17	.19	.20	.22	
11		.15	.17	.19	.20	.22	.24	.26	.28
12		.18	.20	.22	.24	.26	.28	.30	.32
13		.21	.23	.25	.27	.30	.32	.34	.37
14			.26	.29	.31	.34	.36	.39	.42
15				.32	.35	.38	.40	.43	.47
16				.36	.39	.42	.45	.48	.52
17				.40	.43	.46	.50	.54	.59
18				.45	.48	.50	.55	.59	.64
19				.49	.52	.56	.60	.65	.70
20				.52	.57	.62	.66	.72	.77

TABLE NO. XI.

HEMLOCK IN BOARD FEET.

(From Report N. H. Forest Commission for 1906–7.)

Diameter breast high.

Total Height of Tree—Feet.

Inches.	30	40	50	60	70
6	5				
7	10	20	30	42	
8	17	28	39	50	
9	26	36	49	60	
10	36	46	59	71	86
11	47	58	72	86	103
12	60	72	86	103	123
13		88	104	124	148
14		107	125	147	173
15		126	148	172	204
16		148	171	200	240
17			197	233	281

Based on 317 second growth trees grown in New Hampshire, cut with good economy (4½ to 6½ inches in the top) and sawed into edged boards and scantling. Figures derived from actual tally of the sawed lumber.

TABLE XII.

PAPER BIRCH IN CORDS.

(Adapted from Report of N. H. Forest Commission for 1906–7.)

Diameter breast high.	Used Length of Tree—Feet.				
Inches.	10	20	30	40	50
6	.02	.04	.05	.07	.08
7	.03	.05	.07	.08	.10
8	.04	.07	.09	.11	.13
9	.05	.08	.11	.13	.16
10	.05	.10	.13	.16	.19
11	.07	.12	.16	.19	.22
12	.08	.14	.19	.22	.26
13		.17	.22	.26	.30
14		.19	.25	.30	.34
15		.22	.29	.34	.38

Based on 427 trees cut to be sawed. Volumes given are of used portion of tree only. Original figures by Forest Service men in cubic feet converted into cords at the ratio of 96 cubic feet solid per cord.

Beds of One Year White Pine Seedlings in State Nursery, Burlington

An Improved Maple Orchard, Enosburg, Vt.

SECOND ANNUAL REPORT OF STATE FORESTER ON THE PROGRESS OF FORESTRY IN VERMONT.

July 1, 1910.

To the General Assembly of Vermont:

In compliance with Section 2 of Act No. 11 of the Acts of 1908, I herewith submit my biennial report as State Forester of Vermont.

AUSTIN F. HAWES,

State Forester.

Burlington, Vt., October 1, 1910.

Second Annual Report of State Forester.

AUSTIN F. HAWES, M. F.

Inasmuch as my first annual report covered the short period from April 1 to July 1, 1909, this report may be considered as covering the whole period from my appointment to July 1, 1910.

Forestry is such a new branch of agriculture in this country that it is as yet but little understood. The most important duties of a State forester are, therefore, educational, to make people consider the forest as an agricultural crop to be harvested, reseeded, improved, and reaped again; instead of as a mine to be exploited and abandoned. In many parts of Vermont, notably in Essex County and the region between Plainfield and Wells River, and in many of the mountain towns, are seen the evil effects of forest destruction. Industry ceases, and poverty or immigration are the only alternatives for the inhabitants. Between this waste, desolate land and the highly productive big revenue-producing forests of Germany, France and Switzerland there is as much difference as there is between farms overgrown with weeds and with dilapidated buildings and the finely kept, profitable farms of Enosburg and Woodstock. The farmers of the State realize that dairying can only be successful now when proper consideration is given to cleanliness, the quality of the cows, etc., but they are just beginning to realize that the forest needs serious attention and that the principles underlying proper forest management form a study requiring years of observation and experience to master.

FORESTRY LECTURES.

The State forester has been highly gratified at the widespread demand on the part of organizations throughout the State for lectures and talks on forestry. On the accompanying map page 214, the dots indicate places in which he has delivered addresses. These have been for the most part before granges, especially the Pomonas, women's clubs; agricultural institutes; Y. M. C. A. meetings; and church associations and schools. They also include a number of special occasions as the annual meetings of the State Librarians' Association at Middlebury; the Schoolmasters' Association at Willoughby; the State Horticultural Association at Newport; the Vermont Forestry Association at Brattleboro; the Maple Sugarmakers' Association at Burlington; the Women's Federation of Clubs at Rutland. The agreement under which these addresses are made is simply that provided in the Act creating the office: namely, that travelling expenses are borne by the association holding the meeting. The forester

will illustrate his talk with lantern slides wherever the association will furnish the lantern. The duties of the office require such constant travel that the forester is obliged to make the rule of refusing any invitations that would keep him away from Burlington on Sunday. The planting work is so strenuous during the short season of April and May that no invitations for lectures during the those months will hereafter be accepted, unless in the case of some particular occasion that cannot be postponed.

The State forester also gave addresses on State Forest Policy, at the annual meeting of the Society for the Protection of the White Mountain Forests, held at Bretton Woods, N. H., in August, 1909, and on Vermont forestry at the annual meeting of the New Hampshire Forest Commission held in Gorham, N. H., in March, 1910.

EXHIBITS.

It has been our experience that more good can be accomplished by exhibits than by lectures and, accordingly, no opportunity has been wasted for showing the people of the State what the forestry work is. During the summer of 1909 the service maintained such an exhibit at the Greater Vermont Exposition held in Burlington. The exhibit consisted of eight boxes each about four feet long, ten inches wide and six inches deep; filled with earth. Each box was filled with some species of seedlings from the State nursery with a label showing age of stock and instructions for planting. Photographs and posters were also displayed. A number of forestry lantern slides were also displayed among the other pictures shown. Unfortunately the exposition was not well attended.

A similar exhibit was displayed at the agricultural fairs at Woodstock, Springfield, Brattleboro, St. Johnsbury and the State Fair at White River. More people were probably interested in forestry for the first time by these exhibits than in any other way. The State forester or an assistant was in attendance all the time to answer questions, and sometimes both were kept busy by the numerous interested visitors. Exhibits of this kind will be put in at any of the fairs free, upon request by the management.

The success of these exhibits naturally suggested permanent sample forest plantations in the fair grounds; and this spring such a plantation was established with the co-operation of Commissioner Davis on the State Fair grounds just across the race track from the grand stand. This plantation includes blocks of white, red and Scotch pines and Norway spruce all carefully planted six feet apart each way. A request for a similar plantation has been received from the St. Johnsbury Fair Association and the plantation will be made another spring.

The State forester co-operated this spring with the Rutland Railroad; the Commissioner of Agriculture and the University of Vermont in providing an exhibit on the "Better Farming

Special'' train which traversed the territory of the Rutland Road. Much interest in the forestry exhibit and explanatory talks was displayed all along the line. Perhaps the greatest interest was created by the cross section of a white pine tree grown by Mr. Chapin in Middlesex, Vt., which made the remarkable growth of thirty-two inches in diameter in seventy-seven years. The following description of this tree published by this office has been copied by the American Forestry Magazine and other publications.

This section shows by its rings that the tree was seventy-seven years old when cut this winter, so it started in 1832 or a year or two before. Mr. Chapin says that the tree grew on his farm in Middlesex at an elevation of about 1,500 feet on an average soil, mixed with other trees, and that its height growth was fully equal to the diameter growth as shown by the section; for he was able to cut seven twelve foot logs which sawed up 1,495 feet.

An analysis of the growth of this pine sheds an interesting light on the growth of trees in general which people are too apt to overlook. Its diameter inside the bark at various ages was as follows: 10 years 3½ inches; 20 years 9½ inches; 30 years 14¼ inches; 40 years 18¾ inches; 50 years 22¾ inches; 60 years 26¼ inches; 70 years 29 inches; 77 years 31 inches. This shows that the greatest diameter growth was made during the second decade. In fact, during the first twenty years of the tree's life the rings averaged nearly one-half inch in width. As a matter of fact, however, the production of lumber in a tree is not proportional to the diameter growth, but the growth of the whole cross section, or the square of the diameter. Now the cross section of the base of this tree at various ages was as follows: 10 years .07 of a square foot; 20 years ½ of a square foot; 30 years 1.1 square feet; 40 years 1.9 square feet; 50 years 2.8 square feet; 60 years 3¾ square feet; 70 years 4.6 square feet; 77 years 5¼ square feet. In other words, the growth of the cross section in the second decade was .4 of a square foot; in the third decade .6 of a square foot; in the fourth decade .8; fifth .9; sixth .95; seventh .85 and in the last seven years .65. The rate of the growth of the tree culminated, therefore, between the ages of 50 and 60 years; while a superficial examination of the rings would lead one to think that it reached its maximum growth by the age of 20.

It must also be remembered that in addition to the growth there is a constantly increasing quality increment. Not only do the lower limbs drop off in the early life of a tree grown in the forest, thus making the older lumber clearer; but boards two feet wide are no longer common and are worth more per thousand feet than boards a foot wide. The splendid growth of this particular tree is no doubt largely due to the fact that it happened to have the best amount of light and moisture during the first half

century of its growth. It is probable that had the forest been properly thinned at that time the same growth might have been maintained during the next quarter century.

Mr. Chapin has been lumbering this winter and has taken out 70,000 feet from fifteen or twenty acres. He has cut only the good sized trees and has left the ground well covered with thrifty growing soft woods. He believes rightly that it is better to make $800 from the piece as he has this year and be able to repeat the operation in a few years, than it would be to make twice that amount and have a lot of waste land on his hands.

PUBLICATIONS.

It has been the policy of the State forester to print only matter of real interest and until more data is collected on Vermont conditions, only general advice can be issued.

Publication 1, issued as Bulletin 139 of the Agricultural Experiment Station, gave a general definition of forestry and an explanation of the forest work of the State; a summary of forest statistics of the State; and instructions regarding forest planting.

Publication 2, which is quoted elsewhere in this report, deals with forest fires. It gives the State forest fire law; the reports of the wardens for 1905, 1906, 1907 and 1908; a summary of the expenses incurred by the State in fighting fires in 1908; an investigation of the worst fire districts of the State with maps and illustrations.

Publication 3 is a circular of the Experiment Station giving the prices of nursery stock for sale in the spring of 1910, with brief directions for use.

The forester has now in preparation a bulletin on "Thinning and Cutting Forests."

Much valuable information already published by the U. S. Forest Service and the forestry department of various States is of value for Vermonters. The State forester has undertaken to furnish such information in concise form on forestry cards. Six of these have thus far been issued and have been well received both in the State and outside. Mr. Overton W. Price, Treasurer of the National Conservation Association, writes: "I am greatly interested in the forestry cards and hope you will send some to the Forest Service. The plan is well worthy of their attention." Hon. C. R. Pettis, Superintendent of State Forests of New York, says of them: "I never saw so much valuable material in such small space." These cards are reprinted at the end of this report.

ASSISTANCE TO PRIVATE OWNERS.

The forester's office receives innumerable letters on all phases of the forestry work and these are answered as promptly and completely as possible. It should be remembered by corres-

pondents that the forester is travelling about the State more than half the time, and that delay in answering is often inevitable. It is superfluous to request "answer by return mail."

For travelling expenses to and from Burlington the forester will inspect any land in the State, and advise on its management. A number of such inspections have been made, but the requests are not as numerous as they should be. When desired this office will mark all trees to be cut for the same arrangement. A number of requests have been made for supervision of planting. Hereafter the office hopes to be able to supply a man for the work at $2.00 a day and expenses to any purchaser of 10,000 or more trees.

Forestry offers special inducements to men of large business interests who own country estates. They are often too busy to give the personal attention necessary to make other forms of farming profitable, yet wishing to have their property constantly improving, they adopt forestry. The management of a forest requires the least attention of any landed property, although it can be greatly improved by such attention. This office offers to make a working plan of any such tract, laying out a definite amount of work for each year for a period of years, usually a decade. The idea is to treat the whole tract at least once during this period and to make a new plan when this period has expired.

The first working plan made by this office, that for a 900 acre tract belonging to Dr. Wm. Stanford Stevens of St. Albans, situated in Enosburg, will serve as an example. This farm is nine miles southeast of Enosburg Falls, the nearest railroad station. The survey showed the area divided as follows: Meadow, 196 acres; pasture, 344 acres; woodland, 360 acres. The meadow land is not considered in this plan but it is the owner's purpose to plant all of his pastures to forests, as they are not yielding him over 50 cents an acre a year; and to improve his woodlands. A map accompanied the plan dividing the area into blocks numbered in the order in which they are to receive treatment. A prescription was laid down for each year, thus for 1910: "*Woodland*" twenty-two acres will be thinned, Ia being clear cut for planting." 32.4 acres will be planted with white pine, namely blocks I, b, c, d, and e.

An estimate of the trees marked for cutting for 1910 was

30,000 board feet hardwood lumber @ $3.50 stumpage,	$105
130 cords @ $.30 stumpage,	39
Total	$144

Number of trees required for planting 32.4 acres was 34,328 Dr. Stevens reported at the end of the first season that 21,422 feet of lumber were cut which at $3.50 brought, $74.97

and 155 cords @ 25 cents,	38.75
	$113.72

The amount of lumber cut fell short of the estimate because no hardwood logs were accepted at the mill less than one foot in diameter.

As three-year-old transplants were very scarce in the spring of 1910, Dr. Stevens planted

14,400 2-year white pines @ $3.25,	$46.80
9,700 4-year white pines @ $8.00,	77.60
Cost of trees,	$124.40
Cost of labor, transportation, etc.,	84.42
	$208.82

Average cost of trees when planted was $8.70 per thousand, or $10.44 per acre.

Dr. Stevens is the only owner who has thus far availed himself of this offer to make "Working Plans." However, there are now other requests which will be attended to as soon as time allows. Of course these written plans are only necessary for large tracts. The same offer of advice is open to the small land owner, but usually in such case it is given orally to the owner in his woods.

FOREST PLANTING.

As stated in the report for last year the phase of forestry which interests the most people, is the planting of waste lands. It is a curious fact that many lumbermen will strip their lands and then go to the expense of $10 an acre in replanting a few acres, while by better cutting methods their whole area might be kept productive by natural seeding. However, planting should be encouraged in every way possible not only because there is a great deal of waste land in the State that needs planting, but because forest planting is the best educator in forestry principles. The man who has expended $50 in forest planting becomes an observer of forest growth and soon absorbs other ideas of forestry.

During the spring of 1910 the State nursery sold 376,700 trees to eighty-one parties as compared to 195,500 trees in 1909.

This was an average of 4,600 trees per purchase showing that most of the orders were small and still of a more or less experimental nature. A number of these people, however, have now had trees from the nursery for two or three years and are committed to the policy of planting a few acres each year. Of these purchasers about fifteen are lumbermen; thirty or more farmers; and the rest land owners of other businesses.

The prices asked per thousand by the State nursery for 1909 and 1910 were as follows:*

Name and age of stock.	1909	1910
White pine 2-year seedlings,	$3.50	$3.25
White pine 3-year transplants,	5.00	5.00
White pine 4-year transplants,		8.00
Scotch pine 2-year seedlings,	4.00	3.25
Scotch pine 3-year transplants,		5.00
Norway spruce 2-year seedlings,		3.00
Norway spruce 3-year transplants,		3.50
Norway spruce 4-year transplants,		9.00
Black locust 1-year seedlings,		2.00

The demand in the spring of 1909 so far exceeded the supply that 350,000 white pines were imported from Europe, no American nurseryman being able to make equal prices.

The Massachusetts, Connecticut, and New York State Forest Services pursued a similar course. These were in part distributed about the State. While planting was going on in New York, it was discovered that some of these imported seedlings were infested with a common European fungus disease, the White Pine Blister Rust (*Peridermium Strobi*), entirely different from the pine blight and not heretofore discovered on American pines. A careful examination showed some indication of the disease on a few of the Vermont imported seedlings. Fortunately, it is a comparatively easy task to eradicate this malady since its spores must spend part of their life on the currant or gooseberry bush. As soon as it was discovered that there was a chance that this disease might exist on the imported nursery stock, a careful examination was made of every plantation thereof throughout the State, and all currant and gooseberry bushes, whether wild or cultivated, within 500, feet were destroyed.

About the middle of April, 1910, the fruiting bodies of this fungus appeared on some of the imported pines which had been set out in the Burlington nursery. About 1 percent of the trees were burned as a means of precaution and two experts were employed to examine again all the plantations made in 1909 and the few made in 1910 with the same stock. The result of this examination was that of the forty plantations examined, the fungus was found in fifteen, and 220 trees were destroyed. The worst case of the disease was on some trees purchased by the Billings Estate three years ago from the Shady Hill Nursery Company of Massachusetts, and probably imported by this company.

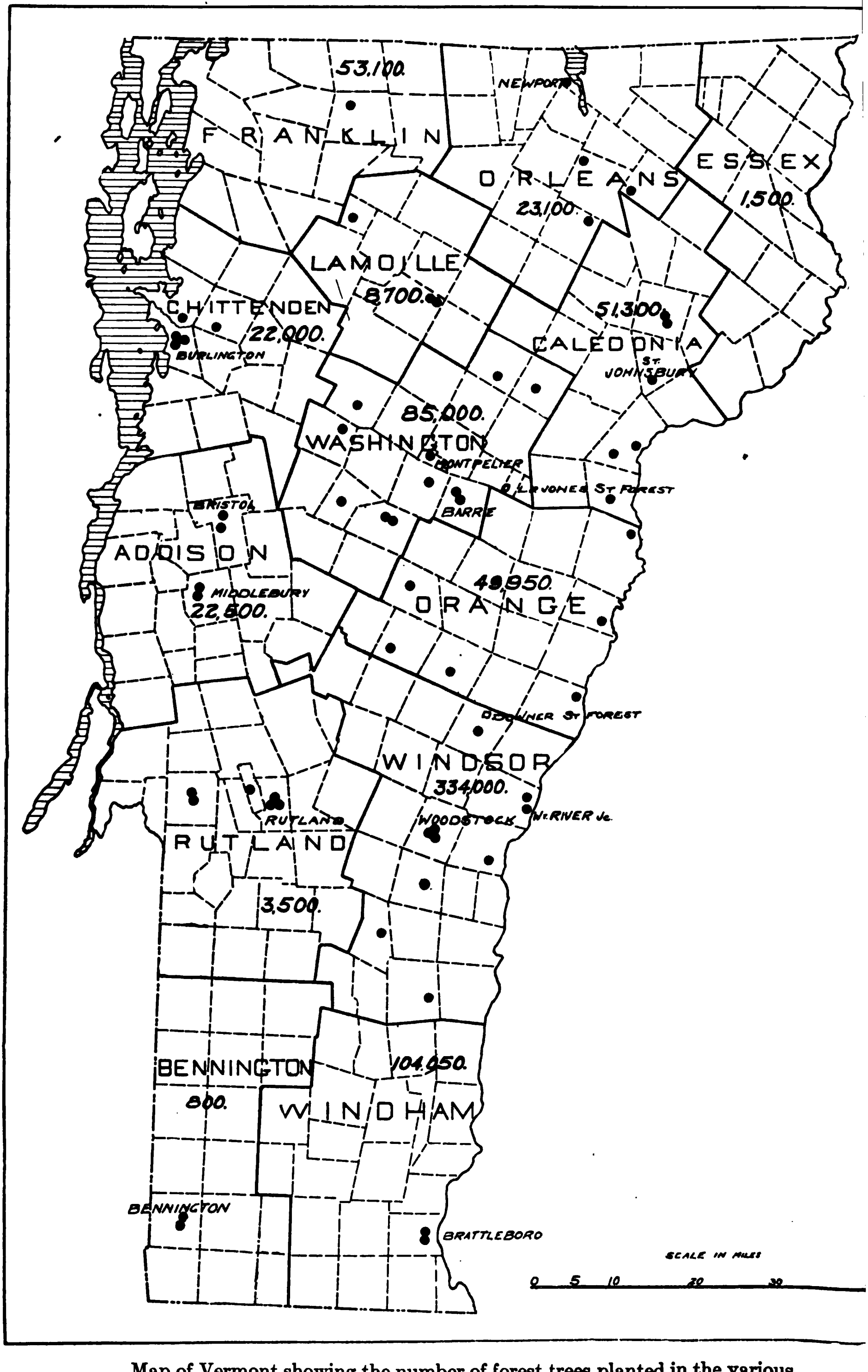
***It is instructive to note in this connection that the lowest price offered by the largest nurseryman of the country even on lots of 100,000 trees is $15 per thousand for 3-year white pine transplants, or three times the price charged by the State nursery.**

The trees are now three feet or more in height and the disease was more easily recognized than on small stock. One hundred and sixty trees in this plantation of 10,000 were destroyed.

No more pines will be imported by the State and it is believed that by repeating the examination of plantations in the spring of 1911, all infested stock will be eradicated.

Arbor Day packages, such as were described in the report of 1909, were prepared again this year for the use of the schools and three packages for $2.00 were sold to each of the following superintendents:

Margaret R. Kelley, Derby.
P. R. Leavenworth, Castleton.
G. J. Seager, South Barre.
C. D. Howe, Essex Junction.



Map of Vermont showing the number of forest trees planted in the various counties during the two years 1909 and 1910.

The dots represent places in which addresses on forestry have been given. The location of the two State forests is also shown.

LIST OF LAND OWNERS WHO PURCHASED TREE SEEDLINGS IN 1910.

ADDISON COUNTY.

Ferrisburg,	E. A. Preston,	1,000 white pine.
Middlebury,	Prof. Edward A. Burt,	2,000 white pine.
		1 lb. white pine seed.
Shoreham,	F. E. Douglas,	1,500 white pine.
Whiting,	Frank Wooster,	1,000 white pine.
		5,500

CALEDONIA COUNTY.

Barnet,	M. D. Gibson,	3,000 white pine.
Groton,	E. F. Clark,	500 white pine.
	Alfred Helie,	5,000 white pine.
		6,000 Norway spruce.
"	Ricker Bros.,	10,000 white pine.
Hardwick,	E. G. Bridgman,	4,500 white pine.
	Wm. Merrill,	2,000 white pine.
		1,000 Norway spruce.
Lyndon,	C. M. Darling,	1,800 white pine.
Walden,	F. N. Rogers,	5,000 Norway spruce.
		39,800

CHITTENDEN COUNTY.

Burlington,	E. S. Adsit,	500 white pine.
Milton,	D. T. Hanley,	13,000 white pine.
		13,500

FRANKLIN COUNTY.

Enosburg,	Dr. Wm. Stanford Stevens,	40,000 white pine.
Fairfax,	Luther B. Hunt,	2,000 Scotch pine.
Franklin,	B. E. Wilder,	1,000 white pine.
Swanton,	P. J. Farrell,	2,500 white pine.
		45,500

GRAND ISLE COUNTY.

South Hero,	T. L. Kinney,	1,000 white pine.

LAMOILLE COUNTY.

Johnson,	C. F. Holdridge,	1,000 black locust.
Waterville,	Paul Bickford,	200 white pine.
		1,200

ORANGE COUNTY.

Bradford,	W. S. Cole,	1,000 white pine.
	F. O. Kennedy,	1,000 white pine.
Braintree,	Theron C. Brooks,	6,000 white pine.
Brookfield,	H. Q. Ward,	1,000 white pine.
Chelsea,	C. A. Densmore,	5,000 white pine.
Newbury,	Nelson W. Bailey,	10,000 white pine.
	David R. Reid,	1,000 white pine.
Randolph,	M. C. Rowell,	1,000 white pine.
Thetford,	C. A. Adams,	1,200 white pine.
	M. B. Cummings,	3,000 white pine.
Wlliiamstown,	M. A. Campbell,	2,000 black locust.
		32,200

ORLEANS COUNTY.

Greensboro,	Rev. C. F. Carter,	500 white pine.
	J. B. Taylor,	1 lb. white pine seed.
	Alton White,	1,000 Scotch pine.
Troy,	Chas. R. Holden,	10,000 white pine.
		11,500

RUTLAND COUNTY.

Castleton,	W. D. G. Smith,	1,000 Norway spruce.
Rutland,	Eddy Bros.	1,000 Scotch pine.
Wallingford,	Jas. J. McGuirk,	500 Norway spruce.
		2,500

WASHINGTON COUNTY.

Barre,	F. N. Rogers,	5,000 white pine.
Berlin,	T. D. Hobart,	5,000 white pine.
Cabot,	L. C. Fisher,	3,500 white pine.
Marshfield,	Laird & Howland,	20,000 white pine.
Middlesex,	C. C. Putnam & Sons,	1,200 white pine.
Waitsfield,	E. H. Jones,	200 white pine.
Waterbury,	Dr. W. L. Wasson,	2,000 white pine.
		1,000 Norway spruce
		37,900

WINDHAM COUNTY.

Brattleboro,	C. R. Barrows,	1,000 Norway spruce.
		2,000 white pine.
	H. E. Eddy,	5,000 white pine.
		5,000 Norway spruce.
	Hon. C. C. Fitts,	5,000 white pine.
		1 lb. white pine seed.
	Holden & Martin,	15,000 white pine.
	Chas. W. Richardson,	5,000 white pine.
		½ lb. white pine seed.
	Scott Farm,	5,000 white pine.
	F. D. E. Stowe,	2,000 white pine.
		1,000 white pine.

Rockingham,	Prof. W. H. Griswold,	3,000 white pine.
	J. H. Lawrence,	5,000 white pine.
	Rev. R. W. Roundy,	1,000 white pine.
Townshend,	A. P. Avery,	2,500 white pine.
		57,500

WINDSOR COUNTY.

Cavendish,	Allen Fletcher, Jr.,	10 lbs. white pine seed.
Hartford,	C. D. Hazen, Jr.,	2,500 white pine.
	E. S. Howard,	2,000 white pine.
		1,000 Norway spruce.
Hartland,	C. B. Hemenway,	10,000 white pine.
Ludlow,	E. C. Carpenter,	2,000 white pine.
	John Pinney,	1,000 white pine.
	F. H. Smith,	1,000 Norway spruce.
Pomfret,	Hewitt & Moore,	2,000 white pine.
Rochester,	J. O. Cannon,	10,000 white pine.
		4,000 Norway spruce.
Royalton,	C. W. Seymour,	2,000 white pine.
	Solon J. Vail,	2,000 white pine.
Sharon,	Mr. Parker,	500 red pine.
Springfield,	F. E. Spellman,	1,000 Norway spruce.
		2,000 white pine.
	W. D. Woolson,	40,000 white pine.
Stockbridge,	Chedel & Wilcox,	5,000 white pine.
Weathersfield,	Miss Mary N. Woodbury,	10,000 white pine.
West Windsor,	Geo. G. Waite,	10,000 white pine.
Windsor,	Gilbert A. Davis,	1,000 white pine.
		1,000 Norway spruce.
		1,000 Scotch pine.
	E. D. Sawin,	12,000 white pine.
	Mrs. Virginia Sherman,	1,000 white pine.
Woodstock,	Hon. George Aitken,	3,000 Norway spruce.
	G. H. Cleveland,	1,200 white pine.
	W. E. Mack,	200 white pine.
		200 Norway spruce.
		128,600

SUMMARY OF TREES PURCHASED FROM STATE NURSERY BY COUNTIES.

	1910	1909
Addison	5,500	1,000
Caledonia	39,800	11,500
Chittenden	13,500	8,500
Franklin	45,500	7,600
Grand Isle	1,000	
Lamoille	1,200	7,500
Orange	32,200	17,750
Orleans	11,500	11,600
Rutland	2,500	1,000
Washington	37,900	12,100
Windham	57,500	46,550
Windsor	128,600	68,100
	376,700*	195,500

SUMMARY BY SPECIES.

White pine	334,500
Norway spruce	32,700
Scotch pine	5,000
Red pine	500
Locust	4,000
	376,700*

THE STATE FOREST NURSERY.

It will be remembered that up to the creation of the position of State forester by the General Assembly in the fall of 1908, there was only $500 a year available for the State nursery. Naturally only a very small beginning could be made with these resources. The law creating this office made it possible to use part of the general forestry appropriation on this nursery, so the work was much extended in 1909 and still more so in 1910. In the fall of 1909 there was no white pine seed crop in the East, and it was, therefore, necessary to procure our seed for spring's planting from Europe and the West. Fortunately there is no danger of the Blister Rust disease being carried in the seed.

There was sowed in the nursery in the spring of 1910, the following:

100 lbs. white pine seed from Germany.
2 lbs. white pine seed 1908 Vermont crop.
5 lbs. white pine seed 1908 Minnesota crop.
55 lbs. white pine seed 1909.

162 lbs. white pine seed.

3 lbs. Norway spruce seed from Billings Estate, Woodstock.
3 lbs. Black locust seed.

168 lbs. in all.

It is impossible at this writing to foretell the success of this spring's seeding, so the following inventory of nursery stock does not take this into account. It is evident, however, from the delayed germination that the seed is not as good as that used the previous year.

*Besides the above list of trees planted in 1910, it must be remembered that the State planted on the lands in Plainfield 35,000 trees and in Sharon 32,000. The International Paper Company planted in Vermont 32,000 Norway spruce which were imported from Europe. Mr. Harkness of Springfield planted 40,000 spruce and pine which he purchased from a Massachusetts nursery; and the Billings Estate of Woodstock planted 50,000 trees of their own raising, making a total number of 565,700 trees planted in 1910.

INVENTORY OF NURSERY STOCK ON HAND JULY 1, 1910.

(Ages given are for the end of the growing season of 1910.)

White pine 5-year transplants,	20,500	
White pine 3-year transplants,	112,000	
White pine 2-year transplants,	94,000	
White pine 2-year seedlings,	1,450,500	
		1,677,000
Scotch pine 4-year transplants,	32,000	
Scotch pine 3-year transplants,	26,000	
Scotch pine 2-year seedlings,	235,000	
		293,000
Austrian pine 2-year seedlings,		7,000
Norway spruce 4-year transplants,	2,000	
Norway spruce 3-year transplants,	2,000	
Norway spruce 2-year transplants,	36,000	
		40,000
European larch 3-year transplants,		1,000
Arbor vitae 3-year transplants,		2,000
Black locust 2-year seedlings,		5,000

SUMMARY OF STOCK IN NURSERY.

White pine	1,677,000
Scotch pine	293,000
Austrian pine	7,000
Norway spruce	40,000
European larch	1,000
Arbor vitae	2,000
Black locust	5,000
	2,025,000*

The inventory made July 1, 1909, showed 707,800 trees in the nursery. The nursery has therefore been increased about three fold during the year.

FINANCIAL STATEMENT DECEMBER 18, 1909.

The Board of Agriculture and Forestry apportioned $9,000 to the State forester for the year ending December 18, 1909, with the understanding that more would be apportioned to the Commissioner of Agriculture the following year.

*To this must be added 48,000 trees in the Sharon nursery.

Under this appropriation expenditures were as follows: For

Books and lantern slides, etc	$147.92
Eradicating pine disease	292.98
Exhibits	40.00
Furniture	193.89
Instruments	288.75
Nursery	3,025.14
Telephone, postage, etc	55.95
Printing fire notices	102.00
Purchase of Plainfield state forest	1,860.00
Salaries State Forester and assistants	1,727.27
Travelling expenses, livery and hotel bills of State Forester and assistants	1,062.52
	$8,796.52
Unexpended appropriation	$203.48

The General Assembly in creating the office of State forester, turned over the annual appropriation of $500 for the State nursery to his charge. Statement of this account to December 18, 1909 is as follows:

	Monies received:	
1909.		
April,	Balance on appropriation from Experiment Station	$140.89
Oct.	One-half annual appropriation	250.00
	From private parties for the sale of nursery stock and seed	1,072.27
		$1,463.16
Expended on nursery		967.57
	Balance on hand December 18, 1909	$496.59

In regard to the nursery it should be understood that a considerable investment was necessary at first to build up an adequate nursery. Hereafter the income from the sale of trees will very largely support the nursery.

GOVERNMENT-OWNED FORESTS.

What forestry has accomplished in Europe has been very largely due to the fact that great land areas in those countries are owned either by the State or local governments or by the Crowns. On account of the long time required to grow a forest, and the fact that governments are permanent, government ownership of forests must appeal even to those opposed to all forms of socialism.

Forestry is practised by every civilized country in the world, except China and Turkey.

The German Empire has nearly 35,000,000 acres of forest, of which 31.9 percent belongs to the State, 1.8 percent to the Crown, 16.1 percent to the communities, 46.5 percent to private persons, 1.6 percent to corporations, and the remainder to institutions and associations.

German forestry is remarkable in three ways. It has always led in scientific thoroughness, and now it is working out results with an exactness almost equal to that of the laboratory; it has applied this scientific knowledge with the greatest technical success; and it has solved the problem of securing through a long series of years an increasing forest output and increasing profits at the same time.

Each state of the German federation administers its own forests. All of the states practise forestry with success. The results obtained by Prussia and Saxony are particularly interesting, for they show how forests may be kept constantly improving under a system of management which yields a handsome profit.

The method of management adopted calls for a sustained yield—that is, no more wood is cut than the forest produces. Under this management the growth of the forest, and consequently the amount cut, has risen sharply. In 1830 the yield was 20 cubic feet per acre; in 1865, 24 cubic feet; in 1890, 52 cubic feet, and in 1904, 65 cubic feet. In other words, Prussian forest management has multiplied the rate of production three fold in seventy-five years. And the quality of the product has improved with the quantity. Between 1830 and 1904 the percentage of saw timber rose from 19 percent to 54 percent.

It is a striking fact in this connection that in the United States at the present time we are using about three times as much timber as our forests grow. If we were everywhere practising forestry with a resulting improvement equal to that made in Prussia, our forests would be growing as much as we use.

The financial returns in Prussia make an even better showing. Net returns per acre in 1850 were 28 cents. In 1865 they were 72 cents; in 1900, $1.58; and in 1904, $2.50. They are now nearly ten times what they were sixty years ago, and they are increasing more rapidly than ever.

In Saxony, which has about 430,000 acres of state forests, the increase of timber cut under forest management, which always means also a corresponding increase in wood produced, has been nearly as marked as in Prussia. The yield rose 55 percent between 1820 and 1904, and is now 93 cubic feet per acre—greater than that of the Prussian forests. Since the chief wood is spruce, which yields more saw timber than the average of trees making up the Prussian forests, the increase in the percentage of saw timber in Saxony naturally exceeds the increase in Prussia. It increased from 26 percent in 1830 to 66 percent in 1904. The net yearly revenue is $5.30 per acre. The yearly expense is $3.00 per acre.

Other German states, smaller and with better kinds of timber and better market facilities, secure even higher returns. The forests of Wurttemberg yield a net annual revenue of nearly $6.00 per acre, and those of several smaller administrations do even better.

A number of the private forests of Germany are managed with great success. As a result of a canvass of 15,600,000 acres of state, municipal and private forests, it was found that the average net revenue per acre, from good, bad, and indifferent land, was $2.40 a year.

France has not quite 18 percent of forests—three-fifths of an acre per capita. This is enough to produce only one-third of the home demand. The country imports annually $30,000,000 worth of wood, and pays $6,000,000 duty and $10,000,000 freight for it. This wood comes from Russia, Sweden, Norway, Austria-Hungary, Germany, and America. Of the 23,500,000 acres of French forests the state owns 2,707,000, and the departments and communes 3,472,000. Since 1827, when the forest code was passed, the state and communal forests have been under management. The state forests yield a clear profit of $4,737,250 a year, or $1.75 per acre; $0.95 is spent for the management of each acre every year.

The great achievement of France in forestry has been the establishment of protective forests where much destruction had been caused by floods and winds. From various causes large areas were cleared of forests toward the close of the eighteenth century, and only when it was too late was it realized that these lands were not fit for agriculture and should have been left in forest. To repair the mistake, a movement to reforest began in the nineteenth century. It was an exceedingly expensive mistake. Down to the present time, encouraged by wise laws, the state, the communes, and private land owners have restored to forest over 2,500,000 acres, and so saved them from ruin. In addition, the resulting forests return an excellent revenue.

Forestry has not only decreased the danger from floods, which threatened to destroy vast areas of fertile farms, and in doing so added many millions of dollars to the national wealth in new forests, but has removed the danger from sand dunes; and in their place has created a property worth many millions of dollars. Applied to the state forests, which are small in comparison with the national forests of this country, it causes them to yield each year a net revenue of more than $4,700,000, though the sum spent on each acre for management is over 100 times greater than that spent on the forests of the United States.

In Switzerland, which has 2,000,000 acres, or 20.6 percent of its area, in forest, the communal forests are the largest, and make up 57 percent of the total; the cantons own 4.5 percent; and private persons own 28.6 percent. The communal holdings

are constantly growing by the purchase of private lands. The general government, or Bund, owns no forests.

The expenditures in forest management vary greatly among the Cantons, ranging from $1.50 to $7.00 per acre. The net annual returns range from $3.00 per acre in the forests where least is expended, to $8.00 or $9.00 per acre in the city forests, where most is expended.

Forest regulations came very early in Switzerland. The first forest ordinance of Bern was issued 600 years ago. The city forest of Zurich, famous as the Sihlwald, has been managed under a working plan since 1680, and is today one of the most perfectly managed and most profitable forests in the world. It yields, on the average, a clear annual profit of $12.00 an acre.

In Austria, which has been independent of the German Federation only since 1866, forestry has, in the main, followed German lines. Austria-Hungary is one of the largest exporters of wood, and the yearly exportations reach 3,670,000 tons.

Austria has 24,000,000 acres of forests, of which only 7 percent belongs to the state and 58 percent is private land. Communal and entailed forests make up the remainder.

Denmark has about 600,000 acres under forest, of which the state owns over 23 percent or 142,000 acres. About 75,000 acres of wastes are in process of reforestation.

Russia's forests are of vast extent. More than 575,000,000 acres, or 39 percent of European Russia is forest, and the Siberian forests of Asiatic Russia contain about 350,000,000 acres. In the more wooded provinces of European Russia the Government owns about 89 percent of the forest land. It owns 65.7 percent of the total forest area. In general, the untouched forest resources of Russia comprise two-thirds of the whole forest area of Europe. Over $30,000,000 worth of wood is exported. The principal countries drawing upon Russia are, in order, England, Germany, Holland, and France.

Russia began to apply forestry before the time of want had arrived, though forest havoc had been wrought. She was not forced into it for self-protection, as were, for instance, Germany and France. The lessons mastered by such other countries were regarded by the Russian government as convincing enough without being actually experienced. The United States stands in a much less fortunate position with regard to forestry. With us the verge of a timber famine has already been crossed, and we are to know what it means to pay for forest waste.

In the size of the country, the variety of the climates, the old habits of forest waste, the damage done by fire, the existence of arid regions and deserts, the problem of floods, the importance of grazing, the possibilities of irrigation, and, finally, the extent of the national forests, Indian forestry has broad lines of resemblance to forestry in the United States.

Since forest planting was begun, more than sixty years

ago, 128,000 acres have been planted, about one-half of which, consisting of teak, will materially increase the output of teak from Burma hereafter.

The state forests are handled on the principle of a sustained and increasing yield. Both natural reproduction and artificial planting are used to keep up the forest growth as areas are cut over. The large increase of the net returns shows how effectively this system of management is working.

Under the old feudal system of Japan the forests were for centuries reserved and cared for, and a continuous policy was assured. In fact, Japanese forests have been managed longer than any of those of Europe. They were controlled before the birth of Christ, and during the early Christian centuries forest planting on watersheds to prevent floods was enforced by frequent edicts, and the felling of trees was supervised by officers of the provinces. As a result, Japan alone among the nations began modern industrial progress with its forests not only unimpaired, but improved after centuries of use.

Private forests are under government supervision. Where they protect mountain slopes they can not be cleared without permission, but must be handled so as to keep the forest cover intact.

The Japanese forests are administered in many ways like our own. The personnel is made up of trained men. Up to recent years Japanese students of forestry had to be educated abroad. Now, however, they may receive thorough instruction in their own country.

China holds a unique position as the only civilized country which has persistently destroyed its forests. What forestry has done in other countries stands out in bold relief against the background of China, whose hills have been largely stripped clean of all vegetation and whose soil is almost completely at the mercy of the floods. Trees have been left only where they could not be reached. Almost the sole use for lumber is the manufacture of coffins. The heavy two or three-inch planks for this purpose are so scarce, and the cost of transporting them by coolies is so high, that they sell for $2.00 or $3.00 a piece.

Nowhere in the world is the forest cleared off down to the very soil as it is in China. When the trees are gone the saplings, the shrubs, and even the herbage are taken. Slender poles are used to build houses; inconsiderable shrubs are turned into charcoal. In the lower mountains of northeastern China, where the stripping process has reached its extreme phase, there is no trace of anything worthy of the name of forest. In the graveyards and courts of the temples a few aged cedars have been preserved by the force of public opinion, and poplars and fruit trees planted about dwellings are protected as private property by the peasant owners.

About one-third of the Dominion of Canada, 1,249,000

square miles, or nearly 800,000,000 acres, are classed as woodland, though the area stocked with commercial timber probably does not exceed 260,000,000 acres.

In the Dominion and the Provinces together, 203,500,000 acres have been made "forest reserves." The proportion of land in these reserves which at present bears merchantable timber is, however, in many cases small. Thus, while the reserves of British Columbia, recently created, nominally cover 100,000,000 acres, it is believed that not more than one-tenth of this area has a growth of commercial timber.

What forestry has done in other countries shows, first of all, that forestry pays, and that it pays best where the most money is expended in applying it.

A second lesson, clearly brought home by foreign forestry, is the need of timely action, since forest waste can be repaired only at great cost.

Third, private initiative does not suffice by itself to prevent wasteful forest use.

Fourth, when the forest countries are compared as to wood imports and exports, and when it is realized that a number of the countries which practise forestry are even now on the wood-importing list, the need of forestry in the export countries is doubly enforced.

During the administration of President Cleveland the idea of national forests first found favor in this country. As in the West there were still vast public domains covered with forest, a law was finally passed by Congress giving the President the authority to set aside any of these lands as national forests. In honor of the President who had such a prominent part in establishing this policy the San Jacinto National Forest, in California, has been renamed the Cleveland National Forest, since the death of the former President.

The policy of the establishment of national forests has been popular with all succeeding presidents, especially with President Roosevelt, who added large areas to the national forest domain. There are at present 150 of these forests with a total area of 194,505,325 acres in the following States:

Arizona	15,258,861	acres.
Arkansas	3,189,781	acres.
California	27,968,510	acres.
Colorado	15,698,439	acres.
Florida	674,891	acres.
Idaho	20,099,029	acres.
Kansas	302,387	acres.
Michigan	163,373	acres.
Minnesota	1,204,486	acres.
Montana	20,389,696	acres.
Nebraska	556,072	acres.

Nevada	5,109,415 acres.
New Mexico	10,971,711 acres.
North Dakota	13,940 acres.
Oklahoma	60,800 acres.
Oregon	16,221,368 acres.
South Dakota	1,294,440 acres.
Utah	7,436,327 acres.
Washington	12,065,500 acres.
Wyoming	8,998,723 acres.
Alaska	26,761,626 acres.
Porto Rico	65,950 acres.
	194,505,325 acres.

The purpose of these national forests is not to prevent the cutting of timber, but to so regulate the use of the forests that they shall permanently be of the greatest possible good to the States in which they are located. In 1908 the Government sold 386,384,000 board feet of timber, receiving for it $773,182.33 Grazing privileges were also sold for 1,380,145 head of cattle and horses, and 7,085,311 head of sheep and goats for $962,829.40 Despite these large receipts, our national forests are not yet on a paying basis because the development of adequate fire protection, a good road system, the planting of waste land, etc., are all necessary and expensive operations. In a few years we may expect that the revenue from these forests will exceed the expenditures on them.

STATE FORESTS.

It is doubtful whether in the East the National Government will ever enter extensively on the purchase of forest lands. But already a number of States have seen the wisdom of this policy and the area included in State forests is as follows:

New York	1,611,817 acres.
Pennsylvania	863,000 acres.
Hawaii	443,166 acres.
Wisconsin	253,573 acres.
Minnesota	43,297 acres.
Michigan	39,000 acres.
New Jersey	8,958 acres.
Maryland	3,540 acres.
Indiana	2,000 acres.
Connecticut	1,360 acres
Massachusetts	1,000 acres.
Vermont	800 acres.
New Hampshire	60 acres.
Total	3,271,571 acres.

SUMMARY.

National Forests........................	194,505,325 acres.
State Forests............................	3,271,571 acres.
	197,776,896 acres.

VERMONT STATE FORESTS.

There are several reasons for advocating the creation of State forests in Vermont; reasons which must eventually result in large areas becoming either State or national forests.

In the first place it has been proved in other States that private forestry practise is stimulated more by example than by any other method. Tracts owned and managed by the State in the various forest regions will soon result in an entirely different attitude toward the forest.

In addition to the two tracts already established in Washington and Windsor Counties described below, educational forests of this nature should be immediately established in Bennington, and Essex Counties where there is the most need of forestry, but as yet the least interest in it, and later on in Windham County and in the northwestern portion of the State, either in Franklin, Chittenden or Lamoille Counties.

The ultimate object of State as well as national forests, must be either for the protection of water sources or for the raising of timber. In order to be of any material value for either of these purposes large areas must be controlled. It is hardly conceivable, for example, that the flow of the White River, our most important tributary of the Connecticut, would be affected by an area of less than fifty thousand acres, even if carefully selected to include the springs and brooks contributing to it. The amount of timber which could be raised on a tract of this kind would be of material value to the industries of the region. Cutting conservatively after a series of years, the annual crop might well be twenty-five million board feet or one-tenth the present cut of the State (made without regard to the future).

Not only would the income from such a tract be a handsome asset to the State but many regions that have run down during the past generation would be built up on the industries thus made permanent. The State can wait for a longer term of years than the private owner, and by State ownership of large tracts a supply of large dimension timber would be assured for future generations. Altogether for protection purposes and for the better use of otherwise waste lands, the State of Vermont should unquestionably own at least 100,000 acres. Compared to 5,846,000 acres, the total area of the State, this is a small portion, but if properly selected in the Green Mountain range, it would be of great benefit

to the whole State. Its value in preserving the beauty of the State's scenery is not to be overlooked, and this will undoubtedly be more of a commercial asset of the State in the future than it has been in the past.

DOWNER STATE FOREST, SHARON.

The State has received from Mr. Charles Downer of Sharon a most valuable gift consisting in a tract of about 350 acres with a very finely built house and stable. This is situated in the town of Sharon about four miles from the station on the road to Strafford. It is a hilly piece of land with elevations varying from about 1,400 feet to 1,800 feet. Most of it has been used for pasture purposes, but in the lower part near the house is a fairly level piece of about thirty acres, excellent for nursery purposes. There are two or three blocks of hardwood land, part of which could be developed into a first-class sugar orchard. Mr. Downer had planted two orchards near the house, one about three years old and the other about ten. The cultivated land was mostly in grass, but a few acres had been in corn and potatoes and were, therefore, in good shape for a nursery. The house is nicely finished inside with Southern pine and had been the summer home of the Downer family.

While Mr. Downer first suggested to the State forester his contemplated gift, back in the summer of 1909, he hesitated for sometime fearing that it might not be of real value to the State. Governor Prouty and the other members of the State Board of Agriculture and Forestry were unanimous in their belief that the tract offers exceptional opportunities for experiments and demonstrations along both forestry and agricultural lines. It was Mr. Downer's wish that the tract be also used for the breeding of game birds, and Commissioner Thomas, on inspection of the property, said there were excellent opportunities for such work. While it was the donor's intention that the property be used for agricultural development and bird raising as well as forestry, the only law under which the property could be received by the State was that giving the Governor the authority to receive land for forestry purposes. It is very much to be hoped that the General Assembly will make some provision for the use of certain portions of the tract for agricultural and game purposes; and that eventually the house may be used for educational purposes.

The first step in handling the property was to secure Mr. W. O. Childs for caretaker. Mr. Childs has charge of the farm and nursery and will always be glad to show visitors about the property and explain any of the work. Mr. Downer gave with the place, all the farm tools, and has allowed the use, temporarily, of the household furniture.

With the growing demand for forest seedlings it is very

desirable to have a secondary nursery besides the one at Burlington. The soil on the Downer tract is better adapted for this purpose than that available in Burlington and, except for the four-mile haul to the railroad, the place has every advantage for a nursery. On account of the inexperienced help it was thought best to start in on a small scale this year, preparing a larger piece for use next year by raising potatoes. Accordingly about half an acre used last year for corn was manured, plowed, harrowed and used for a nursery in 1910. There were planted in this nursery 13,500 two-year-old white pine seedlings and 10,000 two-year-old red pine seedlings, raised by the Yale Botanical Garden of New Haven, Connecticut; 10,000 two-year red pine seedlings raised by the North Eastern Forestry Company in their New York nursery; and 15,000 one-year white pine seedlings raised in the State nursery at Burlington, making a total of 33,500 two-year-old trees and 15,000 one year olds. Twenty-five pounds of white pine seed was sown in seed beds, covered with leaves and protected by lath shades. The whole nursery was enclosed by a hedge of four-year-old trees of Norway spruce, and red pine.

As this tract is to be used in part as a forest experiment station, one of the dryest and poorest slopes was set aside for experimental permanent plantations. Perhaps it should be said that white pine at least has passed the experimental stage, but the term may be applied to some of the other species. There were planted in the spring of 1910:

White pine, four years old, about	10,000
Red pine, four years old, about	6,000
Scotch pine, three years old, about	10,000
Norway spruce, four years old, about	8,000
Total	34,000

The white pines were part of the stock imported from Germany in 1909 and kept in the Burlington nursery for a year. The red and Scotch pines were raised by Professor Jones in the State nursery; and the Norway spruce was purchased in 1909 from D. Hill of Dundee, Ill. The cost of planting was $70.40, an average cost for labor of planting of $2.10 per thousand. The wet season was so favorable that at the time of inspection, June 15, 1910, not over five percent were dead, with the exception of the Scotch pine which were of poorer stock. Perhaps ten percent of the latter had died.

Besides the preparation of land for 1911 nursery by raising potatoes, an area of about three acres on a gentle north slope was put into corn preparatory for later use as an apple orchard, provided provision is made by the General Assembly for the Board's developing agricultural work.

L. R. JONES STATE FOREST, PLAINFIELD.

In the fall of 1909 the State Board of Agriculture and Forestry purchased for the State a tract of about 450 acres in the town of Plainfield. The region was called to the attention of the State forester by Hon. O. L. Martin, Commissioner of Agriculture, and Mr. John Foss, who is well acquainted with all wild lands of the region, finally secured options on the three pieces comprising the tract for the State. State's Attorney Gates searched the titles and found them correct. The average price paid for the land was $4.00 an acre.

In honor of Prof. L. R. Jones, this tract has been named by the Board the L. R. Jones State Forest, following the example of the Federal Government in naming forests after noted forestry exponents. Professor Jones was for twenty years associated with the University of Vermont and brought fame to himself and to the University for his research in botany, especially in the branch dealing with diseases of plants. Although the forestry work was quite apart from his own specialty, his wide interest made him one of the earliest exponents of better forest management in New England. It is due to his efforts more than to any one else's that the State nursery was established in Vermont, that we have a strong State forestry association, which finally secured the creation of the position of State forester, and an awakened interest in the subject among all the people of the State. He was president of the Vermont Forestry Association at the time of his resignation from the University to accept a professorship in the University of Wisconsin in February, 1910. His departure is a great loss to Vermont and it is only fitting that the State honor him by some token of recognition of the valuable work he did for it.

This tract is situated about five miles south from the village of Plainfield in the portion of the town known as Goshen Gore, and on the edge of a 9,000 acre forest belonging to Mr. Cushing of Boston. A portion of it extends up onto the slopes of Mt. Truro, which has an elevation of nearly 3,000 feet, according to Dr. Smith's "History of Plainfield." Goshen Gore at one time was inhabited by several families but it has had none for twenty years or more.

It is in a hilly territory and has elevations varying by about five hundred feet. There are several types of land represented which make it ideal for forestry demonstration purposes. Perhaps one-third of the whole area is run out pasture land which is suitable for forest planting. Another portion, formerly pasture, is now covered with a thick growth of young spruce varying in height from one to forty feet, and in diameters up to ten inches. Still another portion is covered with hardwood growth, either pure white birch second growth or old hardwoods left after the soft woods were culled out.

Bald Hill shows conspicuously for miles around and the north slope of this hill was planted in the spring of 1910 with white pine. It is believed that in three or four years this plantation will be a prominent landmark of the region. The soil is a sandy loam, and the ground free from brush, so that planting was comparatively easy except for the steepness of the slope which only permitted planting in one direction. It is never possible to work satisfactorily down hill. A crew of seven or eight men with mattock was maintained with two men carrying the trees and passing them out. The planting was done under the direction of the State forester and Mr. Foss, and 25,000 four-year-old white pines were planted. These were trees that were imported from Germany the previous year, and had been kept in the nursery in Burlington. Part of the stock was of poorer quality than the rest and will not show as much for a few years. When examined June 14th, seven weeks after planting, fully ninety percent were alive.

In the southeast part of the tract on a rough, ledgy pasture, 10,000 Norway spruce three-year transplants were planted. These were trees imported this year from Germany. They arrived in poor condition due to bad packing and a rebate was secured from the nursery company.

The total cost of the planting operations of 35,000 trees, including labor of planting and livery for drawing plants from station to tract and getting men from Plainfield, was $97.55. This is an average cost per thousand of $2.78 or per acre, (allowing 1,200 trees per acre, which is a spacing of six by six feet) $3.33. This, of course, does not include the purchase price of the trees. The Norway spruce three year olds cost $3.50 per thousand, while the white pines were supplied from the State nursery. 1,200 trees @ $3.50 = $4.20.

Total cost per acre of spruce plantation, $7.53.

THE LUMBER INDUSTRIES OF CALEDONIA, CHITTENDEN AND ADDISON COUNTIES, VERMONT.

During the fall of 1909 and spring of 1910 a canvass was made of all the saw mills and wood working establishments of Caledonia, Chittenden and Addison Counties. The aim of the investigation was to find out the extent of these industries in these three counties; the prices paid for the raw materials now as compared to those of a few years ago, with the idea of shedding light on the diminishing supply of these materials; the kind of products manufactured as suggestions to forest owners and operators in other parts of the State. When the investigation was started it was the purpose of the Forest Service to continue the same line of work throughout the State. The expense,

largely in livery hire, was so large that this will be impossible at present. If there should appear to be inaccuracies in the results set down, it must be borne in mind that mill owners and manufacturers are not always willing to answer questions frankly, although in most cases they appreciated that they benefit by such information more than any one else and were very accommodating to the agent of the service who called on them.

Total amount of lumber cut in a year and average price per thousand feet for lumber.

	No. of thousand feet.			Average price per M. in log at mill.		
Species.	Chittenden:	Caledonia,	Addison,	Chittenden,	Caledonia,	Addison.
Spruce and fir	5,216	9,013	7,313	$11.00	$10.50	$12.00
Hemlock	1,798	2,840	869	11.00	9.50	12.00
Second growth pine	755	3,366	2,222	13.50	11.00	14.00
Maple, birch, beech	1,534	11,919	1,070	10.00	9.00	10.50
Basswood	701	359	760	11.50		15.50
Poplar			324	*10.00		11.50
Oak				*11.00		
Ash	109	313		15.00	10.50	
Total	10,113	27,810	12,560			

From the above table it will be seen that the total amount of lumber cut in these three counties in a year was 50,483,000 feet, of which soft woods including spruce, fir, hemlock and pine made 34,478,000 feet or 68 percent, and hardwoods, including maple, birch, beech, oak, basswood, poplar and ash made 16,005,000 feet or 32 percent. The United States Forest Service reports that the total lumber cut of the fourteen counties of Vermont for 1908 was 304,017,000 feet as against 373,660,000 feet in 1907. If each county furnished an equal portion of the lumber attributed to the State in 1908, three counties would have to supply three-fourteenths of the whole amount or 65,100,000 feet.

It will be noticed that the prices paid for lumber delivered in the log at the mill are invariably higher in the western counties. This is undoubtedly partly due to the smaller supply available. No prices were given for oak or poplar in Caledonia County, nor for fir in Chittenden County.

CALEDONIA COUNTY.

The following is a list of articles manufactured from wood in the county, and the firms engaged in making them in 1909.

Baskets.

F. C. Bolton, Boltonville.

Bobbins.

Ricker Bros., Rickers Mills.
T. B. Hall, Groton.

*The amount of poplar and oak cut in Chittenden County was so small that it is included in with the hardwoods: birch, maple and beech.

Boxes and box boards.

Geo. L. Brown, Barnet.
Roy Bros., East Barnet.
Fairbanks Scale Company, St. Johnsbury.
F. R. Whipple, Sutton.

Blinds, sashes, doors, window casings.

Geo. L. Brown, Barnet.
A. L. Bragg, St. Johnsbury.

Cow stanchions.

Roy Bros., East Barnet.

Croquet sets.

Roy Bros., East Barnet.

Flooring and interior finish.

E. A. Darling, East Burke.
Geo. L. Brown, Barnet.
G. B. Shipman, Hardwick.
Edward Kilgarlan, Hardwick.
C. W. Philbrook, McIndoes.
W. D. Stinson, St. Johnsbury.
Hastings Supply Company, St. Johnsbury.
Follensby & Peck, St. Johnsbury.

Furniture stock.

A. Daniels, West Danville.
Miller & Ayres, Groton Pond.
Jones & Shields, St. Johnsbury.

Lumber rough or planed.*

C. L. Carter, Barnet.
Roy Lumber Company, R. F. D., Barnet.
Willoughby Land & Lumber Company, Willoughby.
A. A. Royce, Danville.
F. V. Kingsbury, East Barnet.
M. E. Moore, Harvey.
G. B. Shipman, Hardwick.
Robert Allen, East Hardwick.
C. M. Sawyer, R. F. D. 2, Hardwick.
Daniel Paris, Lyndon.
R. M. Jennison, Peacham.
M. S. Sargent, South Ryegate.
J. A. Moore, Wells River.
Baldwin & Stevens, Wells River.

*Besides those named here many of the other manufacturers named under other headings also make lumber.

W. D. Stinson, St. Johnsbury.
W. L. Russell, St. Johnsbury.
Cary, Rickaby & Stevens, St. Johnsbury.
H. E. Sheldon, Sheffield.
Jesmond Bros., Sutton.
A. J. Clark & Gray, Sutton.
John B. Goslant, Walden.
L. N. Cree, Wheelock.

Novelties, tops, ten pins, etc.
L. B. Harris Novelty Company, Lyndonville.

Pulp.
Ryegate Paper Company, East Ryegate.

Shingles.
Roy Lumber Company, R. F. D., Barnet.
G. A. Rennie, R. F. D. 2, Lyndonville.
F. R. Whipple, Sutton.
John B. Goslant, Walden.

Tubs.
J. L. Davidson, Barnet.

Veneer.
Williams Manufacturing Company, East Burke.

Wagon and sled stock.
J. L. Davidson, Barnet.
Roy Bros., East Barnet.
John H. Ryan, St. Johnsbury.

Miscellaneous, patterns, pulleys, sawmill machinery.
O. V. Hooker & Sons, St. Johnsbury.

USES OF DIFFERENT SPECIES.

Spruce.
Rough, planed and matched boards; window casings; wagon and sled bodies; butter boxes; newspaper stock; box boards; boxes and crates for Scale Company.

Fir.
Planed and matched boards; boxes for local creameries; box boards; newspaper stock.

Hemlock.

Rough, planed and matched lumber; dimension timbers.

Pine.

Rough, planed and matched lumber; interior finish; doors; tubs.

Basswood.

Moldings and cabinets; tubs; laundry baskets; sashes.

Ash.

Sleds and wagons; sled runners; laundry baskets; chamber furniture.

Maple, Birch and Beech.

Rough, planed and matched lumber; sleds and wagons; croquet sets; cow stanchions; flooring, interior finish, sheathing; veneer; chair stock; bobbins and speeders; blinds.

MARKETS.

The rough lumber is largely consumed in the local market, while the planed and matched stock goes to Boston and other points in New England. Chair stock manufactured in West Danville was shipped to Gardiner, Me. Baskets made at Boltonville were shipped to Boston, Providence and New York. Pine lumber made at McIndoes was shipped in the rough to the factories of the Diamond Match Company at Lisbon, N. H. Veneer made at East Burke was shipped to Northampton to be finished. The newspaper stock made at East Ryegate was mostly shipped to New York. This was largely made from Canadian wood but part of it also came from New Hampshire.

Average prices received for sawed lumber in the rough, f. o. b. at the mill per 1,000 feet, were as follows:

Spruce, $16 to $18. Pine, $20 to $22. Fir, $16 to $18. Basswood, $16 to $18. Birch and maple, $13 to $15. Oak, $25. Ash, $16 to $18. Hemlock, $16.

Hardwood flooring brings $37 f. o. b.

Clear red birch flooring brings $45 f. o. b. and $60 in Boston.

No. 1, clear, dressed spruce boards bring $25 to $30 f. o. b.

No. 2, clear, dressed spruce boards bring $20 to $30 f. o. b.

Common matched boards bring $19 f. o. b.

Bobbins bring from $2.50 to $2.90 per 1,000 f. o. b.

Cedar shingles bring from $2.25 to $3.50 per 1,000 in local markets.

Mr. Whipple of Sutton reports that 1,000 feet of logs will make from 7,000 to 8,000 shingles.

The usual prices for custom sawing are $2.50 to $3.00 per 1,000 for softwoods, and $3.50 for hardwoods.

Some of these concerns own large tracts and make a business of buying timber lands and stripping them, others purchase all logs delivered at the mills or do custom sawing.

Those owning tracts are as follows:

Fred Allen, 170 acres spruce and white birch in Barnet; 75 acres pine, hemlock and hardwoods in Peacham. Roy Bros., 350 acres in Barnet. E. A. Darling, large tracts in Burke and Kirby. Williams Manufacturing Company, 7,800 acres in East Haven, Newark and Ferdinand. Willoughby Land & Lumber Company, 7,000 acres. A. A. Royce, 300 acres in Peacham and Danville. Miller & Ayres, 9,000 acres in Peacham and Groton. C. M. Sawyer, R. F. D. 2, Hardwick, 400 acres. R. M. Jennison, 400-500 acres in Peacham. M. S. Sargent, So. Ryegate, 150-200 acres. Parker & Young, large areas. Fairbanks Scale Company, 3,300 acres in St. Johnsbury and surrounding towns. Hasting Supply Company, 6,000 to 7,000 acres in Concord and Lunenburg. Follensby & Peck, 1,000 acres in Victory. John B. Goslant, Walden, 1,000 acres.

Altogether the above concerns probably own from 40,000 to 60,000 acres. Of course there are many other large tracts owned by other parties.

Among these various manufacturers there was a unanimous admission that the prices of lumber have considerably advanced during the past decade. They did not, however, agree as to the amount of this advance. One man says $3 to $4 per 1,000 for logs at mill; another one-fourth more, which would be about the same as the first statement; another $2 per 1,000; another one-third more for hardwoods and $2 per 1,000 more for softwoods; another that all timber is one-third higher, etc.

CHITTENDEN COUNTY.

List of articles made from wood, and firms making them.

Boxes and box boards.

B. & S. Lumber Company, Fort Plains, N. Y.
Winfield Scott, Charlotte.
Daniel Patrick, R. F. D., Richmond.
Richmond Lumber Company, Richmond.

Clapboards.

F. A. Jewett, Jonesville.
B. & S. Lumber Company, Fort Plains, N. Y.
Geo. Bartlett & Company, Huntington Center
W. E. Hanks & Son, Hanksville or R. F. D. Starksboro.

Plantation of Red Pine made Spring 1910, Downer State Forest, Sharon

Fine Reproduction of Sugar Maple, Downer State Forest, Sharon, Vt.

Chair stock.
B. & S. Lumber Company, Fort Plains, N. Y.
E. H. Prindle, R. F. D., Hinesburg.

Chair spindles and dowels.
W. E. Buxton & Company, Jericho.

Excelsior.
Chas. K. Murray, R. F. D. 1, Richmond.

Flooring.
F. C. Slater, Underhill Center.

Lumber, rough and planed.
A. E. Crandall, Jonesville.
F. A. Jewett, Jonesville.
G. M. Gordon, West Bolton.
B. & S. Lumber Company, Fort Plains, N. Y.
Winfield Scott, Charlotte.
R. L. Wright, Colchester.
Daniel Patrick, R. F. D., Richmond.
E. H. Prindle, R. F. D. 1, Hinesburg.
Geo. Bartlett & Company, Huntington Center.
A. J. Crandall, Huntington.
W. E. Hanks & Son, Hanksville or R. F. D. Starksboro.
Mrs. Herbert Norton, Huntington.
H. E. Bates, R. F. D., Jericho.
E. Q. Curtis, Jericho.
Richmond Lumber Company, Richmond.
D. W. Knight, Riverside.
F. C. Slater, Underhill Center.

Novelties and novelty stock.
G. W. Palmer, Richmond.
E. H. Prindle, R. F. D. 1, Hinesburg.
W. E. Buxton & Company, Jericho.

Pulp.
The International Paper Company, Milton.

Staves.
Geo. Bartlett & Company, Huntington Center.
W. E. Hanks & Son, Hanksville or R. F. D. Starksboro.

Scythe snath stock.
R. J. Edwards, Jonesville.

Toys.
G. H. Smith, Jericho Center.

USES OF DIFFERENT SPECIES.

Spruce.
Rough, planed and matched boards, planks and dimension; clapboards; butter boxes; staves; pulp.

Hemlock.
Rough, planed and dimension; butter boxes.

Pine.
Rough and planed boards and planks; boxes.

Basswood.
Rough boards, boxes; box boards, excelsior; toys.

Ash.
Scythe snaths; rough boards, chair stock.

Maple, birch and beech.
Rough, planed and matched lumber; novelties; chair stock; novelty stock; dowels; flooring.

Oak.
Rough lumber.

Poplar.
Boxes.

MARKETS.

Nearly all the rough, hardwood lumber is shipped to Burlington for finishing, while the larger part of the rough, planed and matched spruce, pine and hemlock is consumed in the local markets, though one or two of the larger manufacturers shipped spruce, rough, planed and matched, to Burlington, Boston and other New England points.

Nearly all boxes were used by Vermont creameries and milk condensing plants. Chair stock manufactured at Hinesburg went to West Rochester, N. Y.

Clapboards and staves made at Huntington Center and Hanksville were shipped to Boston and New York.

Toys made at Jericho Center were shipped all over United States.

Excelsior made at Hinesburg was shipped to Ohio and Massachusetts.

The products of the novelty shops are shipped all over the United States and even to foreign countries.

The pulp made at Milton was shipped to the Company's

finishing mills in various parts of the country. Nearly all this wood came from Canada.

Average prices received for sawed lumber at mill per 1,000 feet.

Spruce, $17 to $20; pine, (sap pine), $18 to $20; pine, (old growth), $20 to $30; hemlock, $16 to $18; basswood, $19; birch, beech and maple, $15 to $18; oak, $20 to $24.

Ash sawed into chair stock and delivered at West Rochester brings $50; rough lumber $14 to $16; staves bring $25 a hundred bunches f. o. b. (one bunch contains enough staves for 7 kegs); clapboards $9 to $24 per thousand.

Some of the concerns owning timber tracts are:

A. E. Crandall, 970 acres spruce and hardwoods in Bolton; R. J. Edwards, 350 acres spruce and hemlock and 30 to 40 acres white pine in Bolton; F. A. Jewett, 700 acres spruce and hardwoods in Bolton; B. & S. Lumber Company, 2,500 acres spruce and hardwoods in Bolton; Geo. Bartlett Company, 4,500 acres in Huntington, Duxbury and Fayston; W. E. Hanks & Son, 1,700 acres on East and West Mountains.

Nearly all the manufacturers admitted that they had to pay more for lumber now than ten years ago and all agreed that the quality of lumber obtained today is much poorer than formerly. Several mills have been closed in the past two or three years because they are unable to obtain a supply of lumber. One man said lumber had advanced $4 to $6 per 1,000 feet in ten years and another $5 to $7 per 1,000 feet in the last ten years. The novelty manufacturers agree that they have to pay $1 to $1.50 more per cord than ten years ago. Prices for custom sawing range from $2.50 to $3.50 for softwoods and from $3 to $4 for hardwoods.

ADDISON COUNTY.

Altogether there is invested in wood using and lumber manufacturing plants in this county about one quarter of a million dollars. It is, therefore, very important from the standpoint of these owners as well as of the workmen and farmers of the region, that the woodlands be maintained in a productive state. The average value of the small permanent water mill and of the portable steam mill varies from $1,000 to $3,000. The plants which do turning and make products other than lumber represent an investment of from $10,000 to $15,000, while there are a few more expensive plants in the county.

List of articles made from wood and firms making them.

Boxes and box boards.

Bristol Novelty Company, Bristol, Vermont.
New Haven Mills, New Haven.
Lincoln Lumber Company, Lincoln.
W. S. Huntley, Ripton.
Drake, Smith & Company, Bristol.
L. Corey & Son, Vergennes.

Butter boxes.

W. S. Huntley, Ripton.
Lincoln Lumber Company, Lincoln.
Nelson Murra, West Lincoln.

Caskets.

Bristol Manufacturing Company, Bristol.

Clapboards.

L. D. Jackman, So. Lincoln.
Jackman & Garland, So. Lincoln.
Farr & Kennedy, Hancock.
D. N. Rice, Granville.
Hill & Miles. Starksboro.

Chair stock.

G. E. Dickson, Middlebury.
Vergennes Manufacturing Company, Vergennes.

Dowels.

Bristol Novelty Company, Bristol.

Flooring.

Norton Bros., Vergennes.

Hammer handles.

E. H. Lyman, Shoreham.

*Lumber, rough and planed.**

Norton Bros., Vergennes.
J. T. StPeter, Ferrisburg.
Lincoln Lumber Company, Lincoln.
D. C. Bent, Ripton.
L. E. Jackman, So. Lincoln.
E. E. Parent, So. Lincoln.
S. R. Chase, Granville.
D. N. Rice, Granville.
V. C. Thomson, Starksboro.

*Many of the companies named under other headings also manufacture lumber.

G. E. Dickson, Middlebury.
W. E. Stoddard, Salisbury.
G. S. Tisdale, E. Middlebury.
Harry Jimmo, Bristol.
J. E. Nash, Monkton.
C. A. Thomas, Monkton.
A. A. Smith, Starksboro.
A. Davis Addison.
Hill & Miles, Starksboro.
A. D. Parkerhill, Cornwall.
A. J. Cook, Richville.
E. H. Lyman, Shoreham.
Smith, Childs & Company, Weybridge.
T. H. Hutchinson, Bridport.

Novelties.
Bristol Novelty Company, Bristol.
The Frary Company, Bristol.

Pulp.
Green Mountain Pulp Company, Middlebury.

Shades and rollers.
Vermont Shade and Roller Company, Vergennes.

Shingles and laths.
D. C. Bent, Ripton.
G. E. Dickson, Middlebury.
C. A. Thomas, Monkton,
A. A. Smith, Starksboro.
L. E. Jackman, So. Lincoln.
G. S. Tisdale, E. Middlebury.

Water tubs and silos.
Drake, Smith & Company, Bristol.

USES OF DIFFERENT SPECIES.

Spruce.
Rough, planed and matched boards; planks and dimension lumber; clapboards; butter boxes; pulp and shingles.

Hemlock.
Rough, planed and dimension; butter boxes.

Pine.
Rough and planed boards and planks; boxes and rough boxes for caskets.

Basswood.
Rough boards, boxes and honey boxes; caskets.

Ash.
Rough boards and chair stock.

Poplar.
Boxes.

Maple, birch and beech.
Dowels; novelties; caskets; flooring and matched lumber.

There are many interesting industries in this county dependent on the forest, the most noted of which is, perhaps, the Bristol Manufacturing Company of Bristol which is, one of the largest casket manufacturers of the country. Besides the large amount of native lumber this company imports a large supply of oak and chestnut from other States.

There are several companies making butter tubs mostly from spruce with some hemlock. The hoops are made of ash.e

Prices received for tubs delivered are as follows:

10 pound tub	12 cents.
20 pound tub	18 cents.
30 pound tub	23 cents.
50 pound tub	30 cents.

It is interesting to note the variety of articles made by the Novelty Companies, such as screw driver handles; smoking pipes and their stems; dowels; small boxes for druggists; cloth pins; toys and buttons.

MARKETS.

Some hardwood lumber was sent to Burlington, Boston and New York for finishing. The large amount of soft woods were consumed in the local markets. The North American Spruce and Lumber Company, shipped to New York City. The Bristol Manufacturing Company consumed a large amount of pine cut from Addison County. Large amounts of clapboards were shipped to Boston; butter tubs and boxes to Providence. Manufacturers of furniture find ready market in Northern New York and most of the novelties are shipped to New York and

Boston. The caskets made in Bristol are sent all over the world. The pulp made at Middlebury is shipped to Bellows Falls and Pittsfield, Massachusetts. This company pays $6.50 per cord for spruce wood with the bark on, delivered at the mill; and $7.50 per cord for peeled spruce.

HISTORY OF IRON REFINING INDUSTRY OF LINCOLN.

Between the years 1840 and 1861, large quantities of iron ore were brought from the iron mines of Northern New York to the town of Lincoln and other surrounding towns. At this time charcoal was used in the refining. Charcoal was burned in two ways; first, the round coal pit where the logs were cut four feet long and piled in form of a hay cock. The second method was to cut the logs twelve or fourteen feet long, piled as an ordinary pile of logs. The logs were then filled in with filling wood and the pile covered with four to five inches of straw and dirt and then fired. There are still old pits in the vicinity of Lincoln 100 feet long. Logs two or three feet in diameter were burned in this way. In some places brick kills were used. In that period the iron ore was brought up the river to Vergennes and the pig iron was sent back by boat to Troy. There were at the time three forges in the town of Lincoln.

LAND OWNERS.

Many of the concerns own large tracts of land covered with forests, which they are endeavoring to manage conservatively, by only cutting from their own timber land when forced to for lack of material.

Some of these are as follows:

Green Mountain Pulp Company, 34,000 acres in Ripton, Lincoln and Goshen; Nelson Murra, 400 acres in Bristol and Lincoln; Lincoln Lumber Company, 1,800 acres in Lincoln and Ripton; D. C. Bent, 400 acres in Ripton; L. E. Jackman, 100 acres in Lincoln; E. E. Parent, 180 acres in Ripton; Farr & Kennedy, 200 acres in Hancock; D. N. Rice, 500 acres in Granville; G. S. Tisdale, 1,000 acres in Ripton; North American Spruce & Lumber Company, 1,300 acres in Hancock and Rochester; Hill & Miles, 350 acres in Starksboro; C. A. Thomas, 200 acres in Monkton; A. A. Smith, 150 acres in Starksboro.

REPORT OF FOREST FIRES FOR 1909.

Reports were received from 220 towns. Of these, twenty towns reported twenty-five fires. These reports are as follows:

Arlington. Fire No. 1. November 15. Ten acres of timber land. Set by hunters. Little damage. Extinguished by warden.

Fire No. 2. November 20. Five acres timber land. Both these fires were at the base of Red Mountains.

E. B. BALDWIN, Warden.

Benson. August 12. Thirty to forty acres hard and soft woodland. Cause unknown. Extinguished by warden. Bill rendered to town $72.75.

J. R. ROOT, Warden.

Brandon. Early in May. Five acres of land cut over the winter before. Cause carelessness. Extinguished by warden. Bill rendered to town $6.15.

J. S. CLARK, Warden.

Colchester. May 10. Two acres farm land. Started by burning brush, and put out by hired man.

S. SNYDER, Warden.

Fair Haven. August. Seven acres wood and pasture. Damage $75. Cause unknown. Put out by owner.

JOHN DELEHANTY, Warden.

Groton. Fire No. 1. August 1. Ten acres cut-over land.

Fire No. 2. August 15. Three acres cut-over land. Both these fires were started by people picking blueberries. Both were put out by warden.

L. B. HALL, Warden.

Holland. June 4 and 5. Six acres mixed growth. Damage $10. Started by brush burning; extinguished by warden. Bill rendered to town $22.70.

E. A. FERRIN, Warden.

Lowell. Fires Nos. 1 and 2. August 15. Would have done considerable damage, as there was a strong wind, had it not been for the warden. Bill rendered to town $9.25.

A. J. STEBBINS, Warden.

Ludlow. June 5. Small fire. Bill rendered to town $3.50.

S. A. COLLINS, Warden.

Morristown. August 15. Twelve acres timber land. About 4,000 feet of logs destroyed, worth $40 and 100 cords worth $250. Cause unknown. Extinguished by warden. Bill rendered to town $47.

C. L. GATES, Warden.

Newbury. Fire No. 1. August 3 and 4. Less than an acre wood and timber. Damage $25. Cause hunters. Bill rendered to town $51.90.

Fire No. 2. October 26. Small fire in timber. Cause hunters. Extinguished by warden. Bill rendered to town $2.10.

JOHN B. SMITH, Warden.

Pawlet. November 22. Small fire set by hunters. Put out by warden. Bill rendered to town $1.

C. E. CLARK, Warden.

Pownal. September. Two hundred acres second growth. Cause unknown. Put out by natural causes, but bill rendered to town for $29.

E. E. POTTER, Warden.

Ryegate. Fire No. 1. July. Fire No. 2. August. One acre of pine. Little damage. Cause unknown. Put out by warden. Bill rendered to town $9.

GEO. G. NELSON, Warden.

Shaftsbury. May 13. Small area timber land. Slight damage Cause unknown. Bill rendered to town $2.25.

L. M. LOOMIS, Warden.

South Burlington. Fire No. 1. June 2. About ten acres of sand plain land. Damage $25. Cause unknown. Extinguished by State Forester. Bill rendered to town $5.25.

Fire No. 2. August 16. Extinguished by second selectman. Bill rendered to town $1.

LINCOLN MERRIHEW, Warden.

Stannard. September 15. Less than one acre of woodland. Cause burning brush along highway. Extinguished by selectmen. Bill rendered to town $5.

CHAS. B. STERNSBURG.

Swanton. August 1 to 5. Two hundred acres swamp land. Little damage. Cause smokers picking berries. Mostly put out by rain, assisted by men. Bill rendered to town $12.

M. W. BARNEY, Warden.

Vernon. April. Seventy acres cut-over land. Stacked lumber worth $400 and seventy cords wood worth $140, destroyed. Claim for damage entered by owner $550. Cause burning brush.

J. C. ALLEN, Warden.

Williamstown. October. Small fire in timber land. Cause hunters.

A. M. GOODRICH, Warden.

SUMMARY OF FIRES OF 1909.

No. of fires.	Total area burned acres.	Total estimated damage.	Total cost of extinguishing so far as reported.
25	570	$985	$280

CAUSES OF THESE TWENTY-FIVE FIRES.

Unknown	13	52 percent.
Hunters	5	20 percent.
Carelessness in burning brush	5	20 percent.
Berry pickers	2	8 percent.
	25	100 percent.

SUMMARY OF FIRES ACCORDING TO MONTHS.

April, 1; May, 3; June, 3; July, 1; August, 10; September, 2; October, 2; November, 3.

From the above reports it will be seen that there were only ten forest fires in the State in 1909 which burned areas greater than five acres; only five whose areas were greater than ten acres; and only two which burned over 100 acres.

There were only two fires which did a damage exceeding $100, according to the reports, and the average damage of all the fires was $39.40.

In only five cases did the cost of extinguishing exceed $25; the average cost being $11.20. There were no towns which required aid from the State in paying these bills as in 1908.

The weather throughout the year 1909 was particularly favorable to the forests for, with the exception of the middle of the summer when there is the least danger from fire, there was no prolonged drought. Nearly half the fires of the year occurred during this dry spell in August.

The fact that the causes of 52 percent of the fires are given as unknown shows that the wardens do not investigate them carefully enough.

CONCLUSIONS AND RECOMMENDATIONS REGARDING FOREST FIRES.

During the summer of 1909, a thorough investigation was made by this office of the forest fires of 1908, which cost the State so heavily. The results of this inquiry were published as Forest Service Publication 2. The summary of the conclusions and recommendations are here reprinted with some slight alterations.

It is evident from the reports of the wardens and the examinations made by the Forest Service that Vermont as a whole is very free from forest fires, but that certain districts, especially in the mountains, are liable to very severe fires.

Very few of them are due to railroads which are responsible for so many in other parts of the country. This is undoubtedly because the railroads of Vermont are almost entirely in the agricultural valleys and do not, except in Essex County, run through any large unbroken forest areas as do those of Maine and the Adirondacks. In Vermont, fires are chiefly due to carelessness of those clearing up land or of hunters and fishermen.

The experience of past years shows that in years of ordinary weather conditions, such as 1909, there are very few fires of any account, but that in seasons of prolonged drought such as the spring of 1903, and the fall of 1908, the districts mentioned are liable to great damage.

The character of the damage done by fire depends very largely upon conditions. The experience of last year shows that in hard woods the fires were almost wholly ground fires, while in soft woods the same fire would often become a crown fire, especially if there was much wind. As crown fires almost invariably kill the timber they are much the most serious. Where patches of soft woods were burned in the midst of hardwoods the crowns of the latter were often scorched so that they would die. The intensity of the ground fire depends on the wind and the inflammable material on the ground. In some cases little damage is done, while in others all the seedlings are destroyed and the old trees so scorched that they become prey to fungous diseases, which later kill them. The part played by hardwoods in these fires suggests the feasibility of checking fires while in hardwoods, and the advisability in our forest management of maintaining hardwood belts in our coniferous forests. This is probably the most effective form of fire line that can be adopted in most of our forests.

Besides the actual destruction of timber and young growth, the fires often seriously damage the soil itself. The humus or vegetable matter is burned out of the soil. This humus is not only valuable as a fertilizer, but because of its water-absorbing power, when it is removed the soil loses this power and becomes dry. On the steep slopes, especially when this binding and absorptive agent has been removed, the soil is frequently washed off leaving bare ledges which will probably never again be reclothed

with soil. There is a good example of such a condition on a hill just north of the Wells River & Montpelier R. R., near Summit. In such situations the snow melts rapidly in the spring, and the water flows off immediately, so indirectly these fires have an important bearing on waterflow and freshets.

Where the soil itself does not suffer to such an extent the character of the forest is invariably changed for the worse. If everything is killed the area becomes a tangle of tops and raspberry and blackberry bushes which makes forest planting impossible. If not quite so severe the soft woods are killed, and only a poor stand of valueless hardwoods is left. No seed trees of the softwoods remain so the only reproduction is poplar, bird cherry, birch, and a few other hardwoods. Thus, for a generation or more, land of this character will produce no timber of value.

Besides belts of hardwoods, other natural barriers which assisted the wardens were the tops of the ridges, for they are usually rocky and fairly free from inflammable material, and fire seldom burns down hill with the same velocity that it burns up; also ledges, brooks and swamps; ravines, roads and pastures. North slopes suffered the least, partly because they are more moist, and partly because the prevailing winds were south or west. These facts naturally suggest the points at which a well-organized force should oppose a fire.

A small force of men can often accomplish more fighting in the night, when there is little wind, than a large force in the daytime.

The most effective method of fighting was by trenching or raking the inflammable material away from the fire. Where the soil is not too rocky, and especially in sandy regions, the most effective way is to throw soil onto the advancing flames. Ground fires can be beaten out by boughs or wet sacks. Where water is available it is of great assistance especially with the use of a spray pump fastened onto a pail. One man should carry this and spray onto the blaze, other men should carry water to keep him supplied, and two men should follow with shovels to put out any blaze that starts up after spraying. This method has been used much in Connecticut. Of course chemical fire extinguishers are even more effective, but these must also be renewed with water.

In Massachusetts many towns have gone to the expense of fitting up wagons with chemical fire extinguishers as these are very effective in a country as well provided with roads as Eastern Massachusetts. Other towns have a more simple outfit. To quote from State Forester Rane: "Wilmington, for example, has two single express wagons which are equipped with twenty ten-quart cans with stoppers attached, six Johnson pumps, six shovels and three brooms each. The wagons are kept at opposite ends of the town. The warden of Pembroke reports that the cost of our three wagons and equipment consisting for each wagon of

fourteen Standard extinguishers, two axes, nine shovels, two lanterns, a large gong, ten water cans, each holding enough for two charges, and under the driver's seat sixty charges of acid and soda, was about $400 each.''

While it is questionable whether with the scanty road service of Vermont Mountain regions our towns would be justified in providing expensive equipment, it does seem that many towns would do well to have a supply of long-handled shovels, rakes, axes, brooms and spray pumps available for emergency.

The present fire warden system has undoubtedly been of great benefit to the State. For most towns no change need be suggested, as the first selectmen are perfectly well able to handle the problems.*

In bad fire districts, however, the present system has proved inadequate. Many of these towns are so cut up with hills and mountain ridges that a fire may burn for a considerable time without coming to the attention of the first selectman, and these first hours are valuable in attacking a fire. Most of the wardens reached the fire within twenty-four hours of notification, but some refused or neglected to attend at all. As there had been no bad fire seasons since the passage of the law up to 1908, some selectmen were ignorant of their duty, and more were entirely inexperienced in directing work of this sort on a large scale. While several very efficient wardens maintained personal supervision of the work throughout the fire, most of them, after visiting the fire, delegated the direction of the work to some one else. This is partially due to the fact that the selectmen are usually the leading men of a town and have interests which make it a personal sacrifice to work for the town at $1.50 to $2.00 per day. However, in some of the towns where the bills ran up into the hundreds of dollars, and were among the most important incurred by the towns, it was most unquestionably the warden's duty to stay at the fire until it was out. Much money could have been saved in some towns by keeping an accurate account of the men employed and the time they worked; and the fires could have been extinguished with less damage if the men had had better generalship. Oftentimes when fires were thought to be extinguished they were left and afterwards developed into a worse fire than the first. Considering these facts, I would suggest that the law be amended in the following manner:

1. So as to allow all wardens $2.00 a day for time spent in connection with their duties as wardens, whether actually fighting fires, investigating suspicious smoke, patrolling in danger seasons, writing reports or other work looking to the prevention of fires.

2. To give the State forester authority to divide towns, where he believes there is particular danger from fire, into two or more districts and appoint in each district an assistant or district warden, who shall serve for a year, but be under the authority of the first selectman. The aim would be to reappoint from

*Accompanying the report were maps of the worst fire districts of the State.

year to year, during good service, the same men, just as will be done in the unorganized towns, so that there will be in these bad fire districts men of experience to assist the first selectman in his work.

3. That the State forester be authorized to expend out of his appropriation such moneys as the Board of Agriculture and Forestry shall recommend for the maintenance of a telephone at the house of any permanent warden; and for paying the expenses of such wardens as he may invite to a local meeting for the discussion of fire problems. This would not be an additional expense to the State, and has for a precedent the meetings of road commissioners; and is also along the line of the Massachusetts law where a special appropriation of $2,000 is made for this purpose.

Most of the serious fires burned largely in cut-over land and gained in this slash a heat and momentum which not only damaged the reproduction, but enabled them to sweep through adjoining forests. The lumbermen of New York, who suffered so much by fires in 1908, secured the passage of a law compelling the lopping of the branches of all soft wood trees from the tops at time of lumbering. This is so that the tops will come in contact with the soil, and being covered with snow, will soon rot so that they will not be a menace for fires in the future. This is rather a drastic law and I would suggest the following modification for Vermont:

4. Whenever a forest owner believes that his property is to be endangered by the lumber operations on a tract nearby, he may complain to the State forester when such operations are beginning. The State forester shall cause all such complaints to be examined, and if he shall so order, the branches of all soft wood tree tops being lumbered shall be lopped. Upon neglect of the owner to carry out the instructions of the State forester within a specified time he shall be subject to a fine of not over $500. The payment of such fine shall not in any way release him from suit for damages should he be responsible for fire thereafter. It would rarely be necessary to require the lopping of these tops on any considerable areas. A strip one hundred yards wide on the side next the complainer would usually be sufficient, but the width of the strip would depend upon the topography.

The forest commissioner in 1908 had great difficulty in auditing the fire bills because many of them were sent in long after fires which he knew nothing of at the time they were burning.

5. The law should oblige the first selectmen to notify the State forester as soon as the expense of fire fighting for a calendar year reaches $100, and the State should not be obliged to pay toward the fighting of any fires which occur before such notice is given.

In Maine a system of fire lookouts has been established on top of prominent mountains. As the writer was anxious to obtain

first-hand information about the success of these stations, letters were sent to prominent lumbermen and officials in Maine. The following are extracts from these replies:

W. M. Shaw of the Shaw Lumber Company, Greenville, Me., says:

"Replying to yours of the 11th, a few years ago and before M. G. Shaw Lumber Company sold their largest holdings in timber lands in our State, I was very much interested in the protection of the forest from fires of different causes. On account of the interest that I took in this protection, and with Mr. W. J. Lannigan of the Hollingsworth & Whitney Company, we first thought of the idea of a lookout station on the top of Squaw Mountain; this mountain being on a township owned by the M. G. Shaw Lumber Company.

"By the consent of owners of townships adjoining, and lands that this station would overlook, we raised by subscription funds to establish this station and connect the same by telephone with our regular local telephone system; sent an engineer onto the mountain with such maps as he could get hold of, and located from the exact point where the station is now located all of the mountains by compass, getting the distance as near as he could from observation and known distances. The engineer made a map from the different maps that he had to work with, which of course were not accurate in this section, as the Government has not completed their survey here, but this map was made on a large scale.

"On the same he put a circle covering a distance of ten miles, another covering a distance of twenty miles, putting the degrees onto the circles; then with a sight, which is a crude affair, the watchman could report the exact direction of any suspicious smoke that he might discover with his glass.

"At the time I was appointed Chief Fire Warden for this section, having the map in the office, and having the watchman report all smokes and fires to me here, I could very easily locate very near where the fire was. After trying this one year, and finding it a success, the State by the same and other methods has established twenty-two stations on the different mountains throughout this State. There is no question with any timber land owner, but what this is the very best protection that could be possibly had against forest fires.

"Each year there hav ebeen a great many fires reported from one or more of the stations, and we have been able to get crews of men onto them very quickly. We have telephone lines running pretty well over the State in this section, and by this method we have gotten some warden onto the fire.

"A great many fires have started, and have been extinguished within a few hours after having first started and when they were very small, and in many instances had they been allowed to burn a few hours longer they would have destroyed a great deal of growth. By the present method, and by the prompt reporting of fires when they are small, it has saved the State a great deal of money in extinguishing the same. A few men will do more on a fire when it first starts than a regiment can do after it gets well under way in the forest.

"In connecting a lookout station by telephone, I would recommend using a ground wire, and as most of the telephone lines throughout the country are of metallic circuits, it is advisable to use the same. This wire is being made by the American Steel & Wire Company of Worcester, Massachusetts, and has proven satisfactory indeed to us here in this section where it has been used four or five years. The stringing of wires on trees has proven to be very expensive maintaining."

Mr. Blaine S. Viles, Chief Fire Warden, Augusta, Me., says:

"Your letter to Mr. Lanigan in regard to the system of lookout stations for the State of Maine is at hand. We find this the most practical and economi-

cal manner in which to handle fires on forest land. We now have twenty-two stations in operation, and will probably add more next year. We select high mountains, overlooking large areas, and connect with telephone, usually running the wire on trees, and using a grounded circuit. On the top of the mountain we have an instrument either iron cased or enclosed in a small shelter. We build a small camp for the accommodation of the watchman as near the top of the mountain as practicable. Here the watchman lives during the dry season, and he also has a telephone instrument in his cabin. He has a map of the surrounding country of convenient scale and a transverse table (Keuffel & Esser, No. 5200) upon which the map is placed. He is directly responsible to the land agent, but under direct supervision of the chief fire warden of the district. He is kept there throughout the summer, but the exact dates are determined by the local chief fire warden. He has a set of glasses (Globe Optical Co., No. 42). He makes a weekly report to the land agent, using the enclosed form. We also have patrols when needed. If there is any other information I can give you, I will be very glad to do so."

Prof. Gordon E. Tower, Professor of Forestry at Orono, Me., writes:

"The system of lookout stations which was established sometime ago in this State has its advantages and disadvantages. Stations have been found to be very helpful in discovering fires at a distance and probably have meant the saving of much timber. On the other hand they have been found to be practically useless in a very dry season when many fires were burning in the forest as proved to be the case last year. This was a very dry season with us in this State, and there were a large number of fires, and a few did a large amount of damage. The air was so filled with smoke that for a long time it was impossible to discover any fires from these lookout stations. It would seem from this that the stations are not of much use at a time when they are most needed. Notwithstanding this fact, however, the timber land owners of the State still continue to establish lookout stations; a few, I believe, having been built this summer."

The States of New Hampshire and New York have now made arrangements for a number of similar fire lookout stations. In New Hampshire all the large timber owners are co-operating with the State toward their establishment.

I would suggest that a law be passed in Vermont similar to the Maine law under which these stations were first established, so that, "Whenever any lumber company or group of forest owners are willing to go to the expense of incorporating such a station and connecting it with the necessary telephone service, the State forester shall be authorized to spend money from his annual appropriation for maintaining a watchman at such station during such period as the State forester may think advisable."

I believe that we should have such stations on Jay Peak, Mansfield, Killington, and on some high elevations in the north-eastern and southern portions of the State. These would not be occupied except in fire seasons and would not, therefore, be of much expense to the State. As supplementary to these there should be provision for the employing of patrols for particularly dangerous regions.

FORESTRY CARDS ISSUED BY THE FORESTER'S OFFICE.

Vermont Forestry Card No. 1.

NUMBER OF SECOND GROWTH HARD WOOD TREES REQUIRED TO MAKE A CORD.

Total Height of Tree...........Feet.

Diameter Breast Inches High	30	35	40	45	50	55	60	65
	Number trees per cord.							
3-5	61	47	38	33	31			
5-7			24	20	17	15	14	
7-9					12	11	10	9

From study by Harvard Forest School on oak thinnings. Wood used up to 2 inches in diameter. 80 cubic feet solid wood per cord.

A study carried on by the forestry students of the University of Vermont with white pine trees 3. 5″-5″ in diameter and 30-55 feet in height showed 28 trees necessary to make a cord.

Choppers prefer the small trees because they are easier to split. Think of the prospective lumber trees that are destroyed in cutting a cord and demand that the worthless and dying old trees be cut first.

Vermont Forestry Card No. 2.

LUMBER AND CORD WOOD EQUIVALENTS.

Logs yielding when split one cord of wood, will yield when sawn according to Biltmore Forest School:

For log diameter	Feet board measure
20″	515′
25″	566′
30″	605′
35″	629′
40″	649′

United States Forest Service adopts 2 cords as equivalent to 1000 board feet, provided that the wood is split from timber 10 inches in diameter and over.

For logs less than 10 inches the equivalent ranges from 500 board feet down to zero.

Vermont Forestry Card No. 3.

COMPOUND INTEREST MADE BY A LOG.

By the Vermont Rule a log 12 ft. long contains the following:

Diam. at top-inches.	Vol. Bd. ft.
10	50
11	60
12	72
13	85
14	98

A 14 in. log contains double amount of lumber of a 10 n. log and of better quality.
At a diameter growth of ¼ inch a year a ten inch log will double in 16 yrs. = 4½%
⅜" a year it will double in 11 yrs. = 6½%
½" " " " " " 8 " = 8½%
Besides this growth in volume of each log the tree is increasing in height and making new logs.
Lesson 1. Do not kill the goose that lays the golden egg.
Lesson 2. Give the goose enough sunlight and opportunity so it will make the best possible interest for you.

Vermont Forestry Card No. 4.

SHIPPING WEIGHTS IN POUNDS PER 1,000 B. M.

	Green from saw	Shipping dry	Well seasoned	Kiln dried
Ash, White	4,600	- -	3,800	3,300
Basswood	4,200	2,800	2,500	2,100
Beech	5,750	- -	4,000	- -
Birch	5,500	- -	4,000	- -
Butternut	4,000	2,800	2,500	- -
Chestnut	5,000	3,500	2,800	2,450
Cherry	5,000	4,000	- -	- -
Hemlock, Northern	4,500	3,000	- -	- -
Hickory	6,000	5,000	4,500	- -
Maple, hard	5,400	4,150	3,900	3,400
Oak, white	5,700	4,500	4,100	3,600
Pine, white	3,500	2,500	2,400	2,200
Poplar	3,900	3,000	2,800	2,400
Spruce, Adirondack	3,300	2,700	2,300	- -

The above table was taken from the "Engineering News" of May 5, 1910, found on page 519 of that issue.

Vermont Forestry Card No. 5. July 1, 1910.

EFFECT OF MOISTURE ON STRENGTH OF TIMBERS.

		Compression parallel to grain. Crushing strength pounds per square inch.				
Moisture Condition	Moisture Percent	Long leaf Pine	Red Spruce	Red Pine	Tama-rack	Chest-nut
Green or soaked cold while green	Over 30	4,500	2,400	1,800	3,200	3,030
Normal air dry	12	7,750	5,800	3,680	6,230	5,550
		1.70	2.40	2.00	1.90	1.80
Kiln dry, at 130° to 145° F.	3.5	13,000	8,900	6,140	10,180	8,500
		2.90	3.70	3.40	3.20	2.80
Resoaked after drying	Over 30	4,040	2,190	1,600	2,940	2,500
		.90	.91	.89	.92	.82
Number of tests used	.....	49	128	108	99	58
Specific gravity kiln-dry wood		.63	.41	.40	.57	.46
Number rings per inch	.....	.26	17.5	7.1	14	5.9

The above table was taken from Circular 108 of the United States Forest Service compiled by H. D. Tiemann, M. E., M. F. The figure below each strength value shows the ratio of increase in strength over the green condition. The table shows that kiln-dried spruce is 3.7 times and air-dried spruce 2.4 times as strong as green spruce, for example. It also shows the relative strength of these different timbers.

Forestry Card No. 6.

WHOLESALE LUMBER PRICES, 1886-1908.

(Dollars per 1,000 feet)

New York Market (Quoted by New York Lumber Trade Journal.)

Species	GRADES.	July 1 1886	Jan. 2 1890	Jan. 2 1895	Jan. 1 1900	Jan. 1 1905	Jan. 1 1908	Percent of inc.
White ash	1st and 2d, 1″ and 1½″ x 8″ and up x 12′.—16′..................	$36.00	$37.00	$38.50	$48.00	$46.00	$60.00	67
Basswood	1st and 2d, ″ x 8″ and up x	22.00	23.00	27.00	26.00	40.00	44.00	100
Birch	"Cherry" black.................	——	35.00	35.00	42.00	47.00	54.00	93
Cherry	1st and 2d.....................	78.00	88.00	90.00	80.00	105.00	105.00	35
Chestnut	Clears, ″ x 10″ and up x 10′ and up	33.00	35.00	35.00	36.00	45.00	52.00	58
Hard maple	1st and 2d, 1″ x 8″ and up x 12′-16′	20.00	20.00	20.00	30.00	30.00	33.00	65
White Oak	Quartered, 1st and 2d, all figured, 1″ x 6″ and up x 12′-16′.......	52.00	48.00	52.50	70.00	83.00	82.00	58
White cedar	Tank planks, 2″ - 3″ x 5″ x 10′ - 18′	——	35.00	32.00	——	40.00	37.50	7
Hemlock	Boards.......................	——	13.00	12.25	17.00	19.00	22.00	69
Spruce	No. 1 and clear 1″ and 1¼″ x 10″ x 13′	——	——	20.00	25.00	32.50	41.00	105

This table compiled by the United States Forest Service shows how lumber has advanced in price during the past 22 years owing to the diminishing supply and the increased demands. There is every reason to expect that lumber prices will continue to rise, a fact very important for the owner of standing timber to bear in mind.

Four Year White Pine Transplants in Vermont State Nursery

REPORT

of the

FORTIETH ANNUAL MEETING

of the

VERMONT
DAIRYMEN'S ASSOCIATION

1910

Compiled by F. H. BICKFORD, Secretary

Montpelier
CAPITAL CITY PRESS
1910.

AN ACT TO PROMOTE THE DAIRY INTERESTS OF VERMONT.

It is hereby enacted by the General Assembly of the State of Vermont:

SECTION 1. The sum of one thousand dollars is hereby appropriated annually to the Vermont Dairymen's Association, for the purpose of promoting, developing and encouraging the dairy interests of this State.

SEC. 2. The Auditor of Accounts is hereby directed to draw an order on the State Treasurer in favor of the Treasurer of the Vermont Dairymen's Association, for the first payment of this appropriation on the first day of January, A. D. 1889, and annually thereafter so long as the conditions hereinafter provided shall be complied with.

SEC. 3. Said Vermont Dairymen's Association shall hold an annual meeting continuing for at least three days, at some town or city in this State of easy access to the people, and in some comfortable and convenient building; and said meeting shall be open and free to the people of the State. At said meeting the best available talent in the country shall be employed to teach and discuss the best methods of dairy farming, and subjects connected therewith; and at the said annual meeting, premiums shall be offered for the best dairy products of butter and cheese, to an amount of at least two hundred dollars; such premiums to be awarded by disinterested and expert judges, and paid by the Treasurer of said Vermont Dairymen's Association.

SEC. 4. The Secretary of the Vermont Dairymen's Association shall, on or before December 1, 1889, and annually thereafter, make a detailed and itemized account to the State Auditor of Accounts, of the receipts and expenses of said Association, which accounts shall be approved and countersigned by the Treasurer and Auditor of said Association.

SEC. 5. If, in any year, it shall appear to the State Auditor of Accounts that any part of the preceding annual appropriation remains unexpended, or has not been honestly or judiciously expended, then such a part or amount shall be deducted from the order for the next succeeding annual appropriation.

SEC. 6. This act shall take effect from its passage.

Approved November 19, 1888.

CONSTITUTION.

SECTION 1. This organization shall be called the "Vermont Dairymen's Association."

SEC. 2. Its object shall be to improve the dairy interests of Vermont, and all subsidiary interests.

SEC. 3. This Association shall consist of such persons as shall signify their desire to become members, and pay the sum of one dollar, and a like sum annually thereafter, and of honorary and corresponding members.

SEC. 4. The payment of five dollars shall constitute a life membership, or the payment of an annual membership fee of one dollar for five consecutive years shall constitute a life member.

SEC. 5. The officers of the Association shall be a President, two Vice-Presidents (one from each Congressional District), a Secretary, Treasurer and Auditor, who shall constitute the Executive Committee, and have the general oversight of all the affairs of the Association.

SEC. 6. There shall be held, during each winter, an Annual Meeting, at such time and place as the Executive Committee may designate, for addresses, discussions, exhibitions, and the election of officers, who shall hold their respective offices for one year, or until their successors are chosen. Said meeting shall continue in session at least three days.

SEC. 7. It shall be the duty of the Secretary to prepare an annual report of the transactions of the Association for the current year, embracing such papers, original or selected, as may be approved by the Executive Committee, and cause the same to be published and distributed to the dairymen of the State of Vermont.

SEC. 8. The Treasurer shall keep the funds of the Association and disburse them on the order of the President or Vice-President, countersigned by the Secretary, and shall make a report of the receipts and expenditures at the Annual Meeting.

SEC. 9. This constitution may be amended at any Annual Meeting by two-thirds vote of all the members present.

AN ACT TO PROVIDE FOR THE INSPECTION OF MILK.

It is hereby enacted by the General Assembly of the State of Vermont:

SECTION 1. No person carrying on the business of selling, supplying or delivering milk or cream from house to house shall sell, supply or deliver milk or cream whether produced from cows owned by him, or in his possession, or under his control, or purchased by him for sale from other diaries, to the inhabitants of the State unless he has procured a license therefor from the Board of Health of the town in which such milk is sold, which is hereby authorized to issue licenses under this act. Before granting such license, the State Board of Health, or their authorized agents, or said local Board of Health, shall make, or cause to be made, a thorough inspection and examination of the cows producing such milk or cream, of the barns, stables and premises where such cows are kept, of all pails, cans and measures used in connection with such business, and of the neatness and cleanliness with which such milk or cream is obtained and dispensed. Such licenses shall not be granted unless such cows are in a healthy condition, nor unless the barns, stables, premises and utensils used in connection therewith are in good sanitary condition nor unless such milk and cream is obtained and sold in a neat and cleanly manner; and if the State Board of Health certify to the Board of Health of any town that a person named therein should not be granted a license, a license shall not be granted such person.

No person who shall incidentally sell or furnish to his neighbors milk or cream from his private dairy shall be construed to be carrying on the business of selling or supplying milk or cream within the meaning of this act.

SEC. 2. Such license shall be for a term of one year, unless sooner revoked by said Board for just cause, and the fee for such license shall be two dollars, to be retained by said Board for its services under this act.

SEC. 3. The local Board of Health shall, at least semi-annually, send to the State laboratory of hygiene, for examination, samples of milk or cream from the herd of each party who has obtained a license, and said license shall allow said Board to take such samples whenever they desire. A person who violates a provision of this act shall be fined not more than fifty nor less than five dollars.

SEC. 4. This act shall take effect April 1, 1909.

Approved January 9, 1909.

AN ACT TO PREVENT THE SPREAD OF BOVINE TUBERCULOSIS BY CREAMERIES.

It is hereby enacted by the General Assembly of the State of Vermont:

SECTION 1. A public creamery which returns to its patrons skim milk or butter milk shall, before returning the same, thoroughly sterilize or pasteurize the same according to regulations to be formulated by the State Board of Health and the cattle commissioner.

SEC. 2. The cattle commissioner shall have such regulations printed at the expense of the State, and shall before April 1, 1909, mail a copy of the same to each creamery in the State.

SEC. 3. A creamery receiving milk from three or more patrons shall be a public creamery within the meaning of this act.

SEC. 4. A person who patronizes a creamery located outside this State shall bring no skim milk or buttermilk into this State which has not been thoroughly sterilized or pasteurized.

SEC. 5. A person, company or corporation, who willfully violates any of the provisions of this act shall be fined not to exceed fifty dollars.

SEC. 6. Section 2 of this act shall take effect from its passage, and the remainder of the act shall take effect May 1, 1909.

Approved January 28, 1909.

AN ACT TO AMEND SECTION 4959 OF THE PUBLIC STATUTES, RELATING TO FOREIGN CREAMERY ASSOCIATIONS.

It is hereby enacted by the General Assembly of the State of Vermont:

SECTION 1. Section 4959 of the Public Statutes is hereby amended so as to read as follows:

Section 4959. Such company shall file in the town clerk's office in each town where it does business a duplicate of its license, and shall at the time of filing such duplicate license file therewith a statement under oath of its President and Secretary, showing the amount of its capital stock, where and in what invested, and the true financial condition and standing of such company; and, in case of a partnership or individual, a statement under oath showing the amount of assets and liabilities and their nature and extent shall be fully and completely set forth. The commissioners shall receive one dollar for each duplicate license.

SEC. 2. This act shall take effect from its passage.

Approved December 14, 1908.

OFFICERS OF THE VERMONT DAIRYMEN'S ASSOCIATION.

PRESIDENT.

F L DAVIS .... Hartford

VICE-PRESIDENTS.

W O BLOOD .... Norwich
W E CARTER .... Rutland

SECRETARY.

F H BICKFORD .... Bradford

TREASURER.

M A ADAMS .... Derby

AUDITOR.

C F SMITH .... Morrisville

STENOGRAPHER.

MISS G. SADIE SMITH .... Rutland

LIFE MEMBERS OF THE VERMONT DAIRYMEN'S ASSOCIATION, 1910.

Andrews, E. A. .... Putney
Alden, B. H. .... Quechee
Adams, G. H. .... South Barre
Adams, M. A. .... Derby
Allen, Charles .... East Berkshire
Armstrong, A. B. .... Dorset
Allen, H. A. .... West Milton
Allen, Henry .... Pawlet
Adams, William H. .... Keene, N. H.
Aseltine, M. L. .... North Fairfax
Aldrich, E O. .... Shrewsbury
Adams, G. W. .... Stowe
Akley, E. H. .... Dummer
Aitken, George .... Woodstock
Allen, G. A. .... West Brattleboro
Allen, F. E. R. F. D. ....

Badger, C. A. .... Williamstown
Burnett, R. E. .... Bethel
Burbank, J. A. .... North Pomfret
Burr, L. R. .... North Clarendon
Bronson, T. G. .... East Hardwick
Barstow, J. L. .... Burlington
Brownell, C. W. .... Burlington
Briggs, Nelson .... Brandon
Brigham, William O. .... Bakersfield
Buck, Abner .... Buck Hollow
Buck, A. N. .... North Ave. Burlington
Burt, William .... Essex
Burt, Frank .... Enosburg Falls
Ballard, B. M. .... Fairfax
Blair, N. B. .... Morrisville
Bliss, Abner .... Georgia
Beecher, H A. .... Hinesburg
Bates, A. E. .... Huntington
Barnum, Ell R. F. D.-1 .... Plainfield
Bent, C. C. R. F. D.-1 .... Plainfield
Brown, J. S. .... Plymouth
Bishop, D. B. .... North Williston
Byington, C. M. .... Charlotte
Barrey, R. E. 173 Chamber St. .... New York City
Beach, H. F. R. F. D .... Vergennes
Briggs, E. L. .... North Pomfret
Burnett, E. A. .... University, Lincoln, Neb.
Bond, John .... East Montpelier
Blood, W. O. .... Norwich
Bass, E. L. .... Randolph
Blake, William H. .... Swanton
Bruce, H. C. .... Milford, N. H.
Bell, F. C. .... Swanton
Barry, Leonidas .... Springfield
Brothers, H. F. .... Hinesburg
Brackett, W. R. .... 9 Chatham St., Boston, Mass.
Bean, G. C. .... Coventry
Belden, H. W. .... Waitsfield
Bickford, F. H. .... Bradford
Buxton, J. E. .... Middleton Springs
Brock, L. F. .... Barnet
Brainerd, E. P. .... St. Albans
Bristol, R. T. .... Vergennes
Bushnell, J. H. .... Williston
Barber, E. L. .... North Williston
Bushnell, H. N. .... Waitsfield
Butler, F. G. .... Hartford, Conn.
Burrell, D. H. .... Little Falls, N. Y.
Baker, J. W. .... Syracuse, N. Y.

Brewer, J. R. .... Hingham, Mass.
Burghan, W. H. .... Montpelier
Beach, W. V. .... Charlotte
Bent, Orrin .... 57 Quincy Market, Boston, Mass.
Brown, B. B. .... Williston
Boutwell, W. C. .... Gaysville
Bristol, E. S. .... Vergennes

Conn. Agricultural College .... Storrs, Conn.
Clifford, A. P. .... North Promfret
Cushman, G. L. .... 75 S. Market St., Boston, Mass.
Carpenter, E. P. .... West Waterford
Chaffee, J. H. .... West Enosburg
Cilley, S. T. .... Fairfax
Congdon, Edwin .... Clarendon
Cahee, J. L. .... Brandon
Cahee, L. J. .... Brandon
Currier, P. W. .... Montpelier
Clarke, M. S. .... Clarendon
Carter, W. E. .... Pittsford
Carrigan, J. B. .... Pittsford
Cady, W. N. .... Middlebury
Creed, C. A. .... Pittsford
Coburn, J. A. .... East Montpelier
Campbell, H. W. .... Holdredge, Neb.
Cutts, H. T. .... Orwell
Chapman, J. H. .... West Rutland
Crampton, M. S. .... Rutland
Chapin, Wm. .... Middlesex
Cowden, H. .... St. Johnsbury
Colvin, J C. .... West Rutland
Cunningham, W. F. .... St. Albans
Colburn, R. M. .... Springfield
Crampton, Charles A. .... St. Albans
Curtis, J. K. .... Georgia
Chapman, George A. .... Williston
Cooley, William .... Waterbury
Cobb, C. H. .... Westford
Crane, George .... Brookfield
Chase, C. P. .... Proctorsville
Chandler, G. C. .... Montpelier
Claflin, G. H. .... St. Albans
Chase, Perry .... East Fairfield
Carpenter, O. G. .... Cambridge
Candon, J. B. .... Pittsford
Choate, C. A. .... West Barnet
Cloverdale Creamery .... North Underhill
Chamberlin, H. D. .... McIndoes Falls
Campbell, Archie .... R. F. D. South Ryegate

Curtis, A. C.	St. Albans
Carter, A. C.	Rutland
Daley, O. W.	White River Junction
Donahue, W. C.	Monkton
Draper, F. W.	Enosburg Falls
Dana, E. J.	North Pomfret
Donahue, J. F.	Vergennes
Doe, G. A.	Newbury
Dutton, F. B.	Woodstock
Davis, G. A.	Rutland
Donahue, W. F.	Ferrisburg
Donahue, T. E.	Hinesburg
Dodge, Harrison	Morrisville
Davis, George	East Montpelier
Donahue, D. G.	East Charlotte
Dwinell, Albert	East Calais
Davis, George F.	Cavendish
Downer, Charles	Sharon
Dewey, Ed	Montpelier
Davis, C. H. E.	Healdville
Douglass, B. J.	Pittsford
Davis, F. L.	Hartford
Denio, W. B,	East Rupert
Douglass, W. B.	Williston
Dagon, M. R.	Madison, Wis.
Deal, T. M.	Fort Covington, N. Y.
Dreman, R. E.	State College, Ames, Iowa
DeThestrup, F.	Burlington
Dunsmore, Geo. H.	R. F. D. St. Albans
Dodge, L. B.	Barre
Eldred, H. S.	Sheldon
Evarts, A. D.	Bristol
Ellis, I. L.	Midddlebury
Eddy, H.	Waterbury Center
Edson, E. A.	Chester
Eddy, C. F.	Stowe
Ellis, Edward	Castleton
Farm Stock Success	Chenango, N. Y.
Foster, F. O.	Lansing, Mich.
Flint, J. S.	155 Loomis St., Burlington
Flint, J. P.	Montpelier
Fisher, L. C.	Cabot
Farrington, C. W.	West Danville
Fletcher, William	Essex Junction
Fassett, G. S.	Enosburg
Fisher, D. W.	Albany, N. Y.

Ferson, B. W. .... Brandon
Fassett, B. F. .... Enosburg Falls
Fassett W. G. .... Enosburg
Fuller, C. C. .... Jonesville
Fassett, A. B. .... East Berkshire
Forbes, D. A. .... Orwell
Frink, W. B. .... Swanton
Freeman, H. O. .... Sherburne, N. Y.
Fowler, F. E. .... South Royalton
Fletcher, A. M. .... Cavendish
Fraser, W. J. .... Urbana, Ill.
Foster, D. J. Hon. .... Burlington
Fillmore Farms .... Bennington

Gale, P. R. .... Stowe
Gates, C. W. .... Franklin
Grout, L. D. .... Morrisville
Giddings, W. A. .... Bakersfield
Grout, J. Ex-Gov. .... Derby
Gibson, J. P. .... Mt. Holly
Gloyd, Jesse .... Richmond
Gilman, A. A. .... Randolph Center
Gleason, H. C. .... Shrewsbury
Goodspeed, Nelson .... St. Albans
Graves, C. O. .... Waterbury
Gallup, J. A. .... West Woodstock
Greene, G. F. .... South Pomfret
Gates & Son, Charles .... North Hartland
Gale, J. E. .... Guilford
Goss, W. G. .... R. F. D. No. 4 St Johnsbury

Howie, A. F. Mrs .... Elm Grove, Wis.
Hewitt, J. D. .... North Promfret
Hill, W. N. .... Starksboro
Hathaway, F. M. .... St. Albans Bay
Hooper, V. A. .... Fayetteville, Ark.
Hatt, B. A. .... North Danville
Hastings, S. J. .... Passumpsic
Harvey, Cloud .... Barnet
Hibbard, C. A. .... Burlington
Hills, J. L. Prof. .... Burlington
Humphrey, A. O. .... Burlington
Hawyard, G. M. .... Middlebury
Heller & Merz Co. .... 22 Cliff St, New York
Holliston, E. B. .... Manchester Center
Hotchkiss, C. A. .... Georgia
Heffon, Franklin .... Highgate Center
Haskins, Kitteridge Hon .... Brattleboro
Hutchinson, William .... Norwich

Hill, H. C. .... Isle La Motte
Hillis, E. C. .... North Montpelier
Howard, Earnest S. .... West Hartford
Hall, L. C. .... Westford
Herrick, A. A. .... West Milton
Hall, Charles .... Montpelier
Head, George G. .... Montgomery
Harwood, J. W. .... Orwell
Hines, Ed. .... Pittsford
Hewitt, Stephen .... North Pomfret
Holoren, Hannah .... Wardsboro
Hoadley, A. E. .... South Woodstock
Howe, W. H. .... R. F. D. South Royalton
Hayes, J. R. .... Stafford
Hitchcock, Ernest .... Pittsford
Higley, Nathan .... Richmond
Hodges, R. W. .... Randolph Center
Hopkins, Daniel .... Waterbury Center
Huse, S. R. .... Waterbury Center
Hazen, C. D. Jr. .... Wilder
Hardwood, Burr .... Dorset
Harris, S. L. .... Proctor
Huntley, George M, ... Westford
Healey, W. M. .... Dudley, Mass.
Hopkins, Hermann Jr. .... Sheldon Jct.
Hannum, P. C. .... Weston
Harrington, W. H. .... North Pomfret
Hyde, Wheeler & Co .... 41 N. Market St., Boston
Hastings, C. A. .... Springfield
Hayward, F. R. .... East Corinth
Heath, W. E. .... Sharon
Hood, C. H. .... 494 Rutherford Ave, Charleston, Mass
Howe, E. L. .... R. F. D. South Rygate

Iowa State Library .... Des Moines, Iowa
Isham, Ed .... St. George

Jones, E. H. .... Waitsfield
Jackson, L. A. .... Hartford
Jackson, J. J. .... Morrisville
Johnson, Arthur .... East Ryegate
Johnson, A. B. .... Malone, N. Y.
Jaynes, R. F. .... Waterville, Me.
Jewett & Son .... Middlebury
Jones, G. M. .... Waitsfield
Jenne, A. M. .... R. F. D. Richford
Johnson, C. C. .... Pomfret

Kingsley, C. J. .... West Salisbury
Kelley, G. A. .... Marshfield
Kingsley, H. E. .... Montgomery
Kinnerson, J. R. .... Peacham
Kidder, N. D. .... Hastings, Neb.
King, M. D. .... Woodstock
Kneeland, D. A. .... Waitsville
Kinfield, Frank .... Morrisville
Kimball, E. M. .... R. F. D. Enosburg Falls

Lyster, H. L. .... Wells River
Lane, C. B. Dairy Div. .... Washington, D. C.
Leonard, N. O. .... Fairfax
Lilly, J. O. .... Plainfield
Lord, W. H. .... Mechanicsville
Lane, B. .... Newport
Loveland, Aaron .... Norwich
Lyster, T. H. .... St. Johnsbury
Lawrence, Henry .... St. George
Lawless, C. C. .... Montpelier
Le Page, Charles .... Barre
Loveland, J. H. .... Norwich
Leary, J. A. .... Jericho
Leonard, W. B. .... Barton Landing
Lewis, M. J. .... Woodstock
Lewis, A. L. .... Rochester
Lilley, C. M. .... Marshfield

McCuen, R. W. .... Vergennes
Monrad, J. H. .... 173 Chambers St., New York
Maynard, A. S. .... Bakersfield
Mann, J. M. .... Fair Haven
Marvin, Thomas, ... Montpelier
Mosley, F. W. .... Clinton, Iowa
Miller, M. H. .... Randolph
Messer, F. A. .... Greensboro
Montgomery, Roy .... Warren
Moore, A. A. .... Richford
Morse, D. H. .... Randolph
Maxham, G. R. .... Woodstock
Merrill, H. J. .... Fairfield
Milligan, J. H. .... Walden
Macomber, D. H. .... Essex Junction
McMahon, C. L. .... Stowe
Macomber, W. H .... Westford
McLam, J. F. .... West Topsham
Macomber, F. H. .... Shelburne
McNall, J. M. .... Milton
McGaffey, E. E. .... 168 Duane St., New York

Martin, C. D. .... East Corinth
Melvin, A. D. .... Chief of Bureau, Washington, D. C.
Mass. Agricultural College, ... Amherst, Mass.
McDonough, P. M. .... Hinesburg
McCauley, D. E. .... Shoreham
Martin, O. L. .... Plainfield
Miner, S. O. .... Brattleboro

Nelson, David .... 34 Allen Ave., Springfield, Mass.
Newton, C. H. .... Fargo, North Da.
Nash, D. W. .... Beldens
Nay, Y. G. .... Jericho
Northrop, P. B. B. .... Sheldon
Newell, Bigelow .... Stowe
Nute, Byron .... Barre
Newton, A. J. .... Wallingford
Newton, W. G. .... R. F. D. St. Albans
N. H. Agricultural College .... Durham, N. H.
N. Y. State Library .... Albany, N. Y.
Noyes, E. H. .... Sharon
Noyes, M. C. .... Sharon

Oliver, J. C. .... Charleston

Public Library .... St. Louis, Mo.
Porter, W. C. .... Sharon
Page, L. B. .... Randolph Center
Parker, E. J. .... Grand Isle
Parker, J. B. .... Whiting
Patten, J. P. .... Williston
Paine, C. S. .... Bethel
Page, C. S., Ex-Gov. .... Hyde Park
Powers, William .... Brandon
Peck, Cassius .... Burlington
Perry, L. E. .... South Pomfret
Pierce, J. H. .... Franklin
Phillips & Son .... E. Candia, N. H.
Pierce, C. C. .... East Clarendon
Place, R. H. .... Essex Junction
Peck, A. M. .... St. Johnsbury
Perkins, W. E. .... Promfret
Palmer, George .... New Haven
Palmer, C. E. .... New Haven
Proctor, F. D., Ex-Gov. .... Proctor
Prouty, G. H. Gov. .... Newport

Richardson, A. E. .... Burlington
Rie, Eli .... West Charleston
Robie, W. C. .... Franklin

Russell, F. L. ....Shrewsbury
Richmond, H. J. ....Guilford Center
Roberts, D. ... .North Pomfret
Reynolds, M. W. ....Middlesex
Robbins, Henry ....Middlebury
Roberts, L. J. ....Waterbury
Ruggles, E. H. ....Westford
Rice, H. W. ....Brookside
Rutherford, W. L. ....Waddington, N. Y
Ricker, N. H. ....Ryegate
Russell, H. L. ....Cuttingsville
Ridlon, M. H. ....R. F. D. West Rutland
Robbins, H. E. ....Derby
Ryan, D. E. ....Orwell
Roberts, G. V. ....Milton
Roundy, Charles C. ....Randolph

State Dairy Bureau......................State House, Boston
Shackford, Mrs. C. J. Nelson ....Ryegate
Stone, W. P. ....Strafford
Sawyer, A. G. ....Topsham
Stafford, Charles ....Chippenhook
Spear, V. L. ....Randolph
Strong, P. W. ....North Pomfret
Symes, E. E. ....Ryegate
Slocum, A. R. ....South Burlington
Stanhope, Spencer ....Berkshire Center
Stevens, S. H. ....Enosburg Falls
Snell, T. T. ....North Enosburg
Stiles, G. M. ....Morrisville
Standard Package Co. ......Board Trade B'ld'g, Boston, Mass.
Stevens, Wm. Stanford ....St. Albans
Small, Fred M. ....Morrisville
Stevens, N. C. ....West Glover
Sanderson, W. L. ....Milton
Sanderson, C. P. ....Milton
Sowles, A. P. ....St. Albans
Smead, C. D. ....West Brookfield
Seeley, H. M. ....Middlebury
Smith, C. F. ....Morrisville
Spaulding, L. C. ....Poultney
State Library ....Concord, N. H.
Sherburne, A. E. ....North Pomfret
Stoddard, M. A. ....Rutland
Smith, N. E. ....Richford
Smith, Francis ....Swanton
Smith, F. V. ....Stowe
Smith, George G. ....St. Albans
Simpson, W . G. ....Waterbury Center

Strong, G. N. ....North Thetford
Sowles, E. A. ....St. Albans
Smith, E. C. Ex-Gov. ....St. Albans
Sprague, N. T., Jr. ....Brooklyn, N. Y.
Smith, E. A. ....Boston, Mass.
Smith, F. B. ....New York
Snow, Mrs. Edward ....Swanzey, N. H.
Sprague, George K. ....East Brookfield
Swan, P. B. ....Montgomery
Scarff, C. W., Col. ....South Burlington
Storrs, A. A. ....East Bethel
Scribner, D. C. ....Charlotte
Stone, M. S. ....Montpelier
Stone, E. A. ....Williamstown
Seaver, W. H. ....Woodstock
Somers, C. L. ....South Peacham
Smith, E. E. ....West Rutland

Towne, E. B. ....Milton
Taylor, A. ....Burlington
Turnbull, J. G. ....Barton Landing
Tarbox, C. ....Jericho
Towle, E. R. ....Enosburg Falls
Thompson, Eben ....North Danville
Teachout, S. D. ....Essex Junction
Tarbell, E. S. ....Montgomery
Terrill, G. H. ....Chazy, N. Y.
Tottingham, L. H. ....Shoreham
Talcott, D. L. ....Williston
Talcott, L. F. ....Williston
Talcott, J. L. ....Oakland, Cal.
Talcott, Frank ....Williston
Tarwell, F. ....Hampton, N. Y.
Terrill, A. N. ....Morrisville
Temple, G. H. ....Randolph Center
Towle, W. W. ....Enosburg Falls
Trescott, A. J. ....W. Rutland
Tracey, J. E. ....Burlington

Union Associated Press ....47 Ann St., New York

Vermont Creamery Co., ...Barton
Vail, H. W. ....Randolph
Van Patten, W. J. ....Burlington

Washburne, N. H., Prof. ....Burlington
Whitaker, G. M. ....Inspection Staff, Washington, D. C.
Warren, L. H. ....North Pomfret
Ware, O. T. ....Brattleboro

Whitcher, J. R. ....Groton
William, W. H. ....Rutland
Wright, Will W. ....Brandon
Wheeler, N. B. ....Brandon
Winslow, C. M. ....Brandon
Washburn, Chat ....Brandon
Williams, N. G. ....Bellows Falls
Walker, N. S. ....Clarendon Springs
Wright, Ellen J. ....Colchester
Woodward J. S. ....Enosburg
Wheeler, Curtis.................................Fairfax
Winslow, H. L. ....North Clarendon
Weed, E. D. ....Hinesburg
Warren, Rufus ....Montpelier
Wheelock, H. R. ....Montpelier
Walker, Willard ....Montpelier
Whipple, Obed Jr. ....North Pomfret
Wheeler, F. H. ....Proctorsville
Whitney, R. W. ....Springfield
Warner, J. N. ....St. Albans
Waller, M. D. ....St. Albans Bay
Whitney, George W. ....Williston
Whitney, Ed ....Minneapolis, Minn.
Wright, H. S. ....North Williston
Willard, D. S. ....North Hartland
Whitney, H. O. ....Williston
Whitelaw, F. R. ....Randolph
Wheeler, W. H. ....South Pomfret
White, A. R. ....East Charlotte
Webster, E. H. ....Chief Dairy Div., Washington, D. C.
Wallace, Sidney ....Waterbury Center
Weston, H. S. ....Winooski
Walker, H. W. ....South Woodstock
Williams, G. B. ....Walpole, N. H.
Williams, J. B. ....Glastonbury, Conn.
Webb, J. T. ....New Braintree, Mass.
Weed, D. W. ....St. Albans
Whitman, C. D. ....Fishers Island, N. Y.
Weston, S. H. ....Winooski
Warner, B. F. ....Johnson
Wilson, James ....Sec'y Agr., Washington, D. C.
Wiggin, F. Warren ....Quechee

NOTE—Your Secretary would consider it a favor if the members would notify him of any changes or corrections in the above list.

ANNUAL MEMBERS—1910.

Ambrose, John .... Derby
Albee, G. H. .... East Hardwick

Ballard, P. D. .... Cambridge
Burnham, Wayne .... R. F. D., South Royalton
Bruce, M. K. .... Passumpsic
Bellows, F. A. .... Marshfield
Bigelow, A. P. .... Ex. Station Burlington
Bessett, F. C. .... South Hero
Bigelow, F. M. .... Essex

Church, L. J. .... Cambridge
Carpenter, O. S. .... Cambridge
Clark, H. F. .... Charlotte
Catlin, George B. .... Burlington
Chapin, C. B. .... Essex Junction
Corliss, N. L. .... Swanton
Collins, H. T. .... Swanton
Coburn, F. W. .... East Montpelier
Churchill, Herbert .... Bakersfield
Candon, J. R. .... Pittsford

Dewey, H. W. .... Sidney Center, N. Y.
Daniels, Harry .... East Montpelier
Dodge, E. A. .... East Corinth
Davis, Fred L. .... Bethel
Duffey, James A. .... Pittsford
Dunsmore, A. P. .... R. F. D., Windsor
Dutton, E. A. .... East Craftsbury
Davis, G. H. .... R. F. D., Castleton

Emmons, W. B. .... Woodstock
English, L. W. .... Woodstock
Eddy, D. W. .... Monkton

Fish, V. A. .... Enosburg Falls
Fuller, B. J. .... Williston
Foster, H. S. .... North Calais
Farnham, H. N. .... East Montpelier

Giddings, E. E. .... Hubbardton
Grant, T. F. .... 9 Fulton Place, Boston
Gebbie, George .... Groton

Hewitt, Mary H. ....North Pomfret
Hancock, J. E. ....East Hardwick

Jacobs, F. A. ....Orwell

King, B. A. ....South Burlington
Kidder, F. L. ....Woodstock
Kendrick, A. E. ....Groton
Ketcham, H. B. ....Hartland

Ladd, C. H. ....Franklin
Leonard, C. H. ....North Pomfret
La Page, Clarence ....Barre
Lee, H. M. ....Windsor
Lothian, C. W. ....Swanton

McLam, Charles E. ....Topsham
Marvin, Bingham ....Montpelier
Martin, R. J. ....Rochester
Martin, C. E. ....Rochester

Prindle, M. ....St. Albans
Putnam, Luther ....Cambridge

Robie, W. S. ....Franklin
Robinson, R. F. ....Ferrisburg
Russell, L. A. ....Cuttingsville
Roberts, A. R. ....North Pomfret
Root, C. H. ....North Craftsbury

Shepardson, E. E. ....Plymouth, N. H.
Shepard, W. F. ....Barre
Sawyer, F. H. ....Morristown
Scott, H. H. ....Cambridge Jct.
St. John, Earnest ....Cabot
Stafford Bros., ...Clarendon Springs
Sisson, Ellsworth ....Providence, R. I.
Sellew, R. F. ....Merchants Row, Boston

Thurlow, H. H. ....46 Clinton St., Boston, Mass.
Talbert, E. J. ....East Hardwick
True, F. L. ....Rutland

Udall, B. R. ....Craftsbury

Varney, W. M. ....Vergennes
Vail, S. J. ....R. F. D., South Ryegate
Vincent, C. B. ....Jericho

Wilcox, H. F.	North Thetford
Winslow, Charles	Rutland
Weeks, Wm.	North Clarendon
Warner & Sons	St. Albans
Walker, D. B.	R. F. D., South Royalton

VERMONT DAIRYMEN'S ASSOCIATION.

FORTIETH ANNUAL MEETING.

The meeting was called to order at 10:30 o'clock A. M., Wednesday, January 5th, by the President, C. F. Eddy of Stowe. Prayer was offered by Rev. C. J. Staples of Burlington.

President Eddy introduced Mayor J. E. Burke who, as a representative of the city of Burlington, expressed pleasure in welcoming the Dairymen's Association to the Queen City. He said he considered there was no more representative audience that he could speak to than to an audience composed of the farmers of Vermont. He styled the Association as "one of the greatest organizations in the State of Vermont," and said that although Vermont was one of the smallest States in the Union, yet she stands at the head of all the others and that that was just as it should be. The speaker laid special stress upon the importance of conserving the forests and the building up of public roads in the State, and called the attention of the dairymen to the benefit they would receive from good roads.

Mr. J. B. Candon, of Pittsford, responded as follows:

That we appreciate Burlington's hearty welcome to the V. D. A. is best shown by our "many happy returns" to the Queen City. This is the tenth consecutive meeting of the V. D. A. which I have attended and I think seven of them have been in Burlington. While these meetings have become a grand yearly reunion, in a social way, of Vermont's dairy and creamery men, yet, we should all be alive to the fact that it is a school where we have experts for teachers, to the support of which the State contributes a stated amount each year and it is up to us to see that she gets her money's worth.

We must have what Hoard calls the teachable spirit; a desire to know. We are accused, as a class, of being opposed to bookfarming, so called, or scientific farming and I am afraid with some reason.

The writings of a generation ago on agricultural topics were often superficial and misleading, and in almost all communities there have been instances where some man with plenty of money and a fad has cut a dash for a while, spent his money and buried the fad; and this, too, is charged up to bookfarming; consequently there exists a prejudice with which the scientific man in agriculture has to contend. "Science is simply a right knowledge of things," and, are you, or am I, to admit that we don't want a right knowledge of our business?

No man achieves success unless he takes advantage of the

knowledge of others, and in no industry are there so many experts to call upon as in that of agriculture, and especially the dairy branch.

On all sides we hear a cry for cheaper food, and especially, dairy products; yet the average dairyman is barely making a living; but the average dairyman produces less than one hundred seventy-five pounds of butter per cow, while we have men in the State who produce from three to four hundred pounds of butter per year from every cow they milk and we want to know how it is done.

I think it is conceded that our fields are not as productive as they were a generation ago; yet we occasionally find a man whose farm lands are increasing in productiveness and we want to know how he does it. This question of conserving the fertility of the soil is one that is claiming the attention of the greatest minds of the country, and are we who are most directly interested to shirk our part?

Ex-Governor Hoard, of Wisconsin, in speaking on this subject, says: "We censure, and justly so, the man who squanders and wastes the inheritance left by his parents but more to be censured is the man who wastes the fertility of the soil, for he is wasting not that which is his but the heritage of generations yet unborn."

Another line in which we want instruction is in the production of cleaner, more sanitary milk. More than one half of the trouble with the milk supply in our cities comes from ignorance. If legislation is to effect a reform in this regard, it must be accompanied by education, and the would-be reformer must take into consideration the changed conditions of now and a generation ago. Milk consumed soon after being drawn, even though produced under unsanitary conditions, might not be bad for one's health; hold the same milk forty-eight hours before it can be delivered to the consumer and it becomes a menace to public health.

I believe the press as a whole in Vermont is taking a wrong stand in this testing for tuberculosis—assuming that it is a graft where the farmer is trying to take some money out of the State. Did you ever know of a man having his cows tested who didn't lie awake nights before he could bring himself up to the sticking point to have it done?

The methods, which the reformer knows to be necessary for production of wholesome, sanitary milk, often seem useless fads to the man who is doing just as his father and grandfather did in producing milk. Once educate the farmer to what sanitary milk is, how it is produced, and the splendid profits from this quality of milk, and the willfully careless man will be starved out of the business.

President Eddy appointed the following Committee on Resolutions:

GEORGE H. DUNSMORE,	St. Albans.
GEORGE W. WALLACE,	Waitsfield.
F. W. WIGGINS,	Quechee.

PRESIDENT'S ADDRESS.

PRESIDENT C. F. EDDY.

It gives me pleasure to be with you at this fortieth annual meeting of the Vermont Dairymen's Association. Looking back over the year that has just passed, notwithstanding the high price of butter, it does not look from my point of view to have been a very prosperous year for farmers. I believe, conservatively speaking, that there has not been made in the State of Vermont more than 75% of an average make of butter the past year.

In my address last year I spoke of the benefit which I thought could be derived from cow testing associations in our State. At the present time I think we have four or five of these cow testing associations in Vermont, and I believe they have been successful. I know of one patron of one of my creameries who has realized the present season more than one-third more per cow than last year, and he is milking from twenty-two to twenty-five cows. What he has done can be done by the majority of the farmers in the State of Vermont. The difficulty with the cow testing association, if any, according to my observation, has been in the farmers not paying close enough attention to it by changing their poor cows for better ones. The actual relation of the efficiency of the individual cow to the real profits in dairy farming is little realized by the people depending on this occupation for a living. The profits of the average dairy farm today could be easily doubled if the farmer would attend to the matter of testing each individual cow and discarding those that would not make 250 pounds, or more, of butter fat each year.

There are about five hundred institutions in the United States giving instruction in agriculture. Of these, seventy are colleges; one hundred and ten, normal schools; two hundred and seventy, high schools; and fifteen, elementary schools. Agricultural colleges are maintained in nearly all of the States, and give a full college course. To quote from one of the Government bulletins: "For those engaged in agricultural occupations—the farmer, dairyman, fruit grower, their sons and daughters—who are enabled to leave home through the winter season, special winter courses have been organized." These courses vary in length from one week to twelve weeks. The nature of these courses is as varied as their length. The special winter courses are the utility courses, important because of their influence of present practice on the practice of the future. They have a powerful influence on young people who are to be the future farmers; on the quality of the soil, farm machinery, and domestic animals which these young people may have to do with when they take charge of a farm.

Now, I wish to say right here, we have a short-term course connected with our Agricultural College in the State of Vermont. I believe it is doing a vast amount of good, and should be better attended by our farmers' sons and daughters. I was reading in the paper, the other day, an account of a man who had followed the ministry, and whose health had given out. His physician ordered him to take up some outdoor occupation. By using what he had saved, and mortgaging his property, he acquired fifteen acres of land and a few cows in Pennsylvania. This man had determined to be a scientific farmer. The land that he bought was not very valuable and he knew nothing about farming. He communicated with agricultural and dairy experts at Washington, and he did things as they should be done in the light of modern scientific methods. At the end of three years he had thirty blooded cows, was employing four men the year around, had paid off the mortgage, and was clearing $1,500 a year on the sale of cows, calves, and farm produce. And he raised from these fifteen acres more food than these thirty cows consumed. It is usually held by farmers in general that it takes from two to three acres to keep a cow, and it is very rare that a cow is kept on one acre. Yet, I believe that what this man did, others can do; perhaps not in this State but in States where they raise from three to four crops, and even more on the same land each year, this should not be a hard problem.

I wish to call your attention again to what I stated in my address last year, that I believe that elementary education should be taught in our common schools. Oklahoma, one of our newest but also one of our most progressive States, has introduced departments of agriculture into its common schools. I believe every boy and girl in our State should devote a certain amount of their time to this subject. In this way their tastes could be ascertained and they could find out whether by nature they are fitted for farming or something else. Country schools do not deal enough with educational lines near at home. Farm children should have a sound education in the basis of English Grammar, Arithmetic, Reading, Writing and Geography, but there are other things which should be instilled into the child's mind. The ideals of farm life, not city life, I believe should be cultivated. How to keep the boy or girl on the farm should be taught in the country schools. There are some very well-to-do farmers. I was reading the other day in a newspaper that in one township in Iowa there were twelve farmers whose average worth was more than $40,000. Much has been done to make farm life less solitary, freer from drudgery, more comfortable, more elevating, and far more profitable. The raised standard of American life applies no less to the city. The improvements in express and railway service, the improvements in the public roads, mail service, telephone and telegraph, and the use of denatured alcohol, gasolene and steam; all these things have helped the farmer very much more than he realizes. The farmer is the only independent citizen that we have.

All other trades contribute to our well being, but they are not essential to it. Individual happiness comes from within but the nation's strength must come primarily from the soil. It was Washington who pronounced agriculture the noblest pursuit of man, and he might have added the most vital.

How I wish I might stand upon the loftiest hill of yonder towering range and speak to the absent sons and daughters of Old New England in a voice that would carry to the Western seas: "Come back! Come back, New England needs you every one. Her hills and valleys are plaintive for her children that have gone. Forsake the treadmill and slavery in the seething marts of soulless trade, and come back to your priceless heritage of independence, health and happiness in the country of your sires." To those pitiful conditioned prodigals, many of them fighting like famished wolves for bare sustenance in the cities, I would point to the rolling acres of this dear old commonwealth, where, for half the actual toil they are now expending, they could live in plenty, fear no man, and rear other sons and daughters to the saving of the State. And so, I say, New England needs desperately the young men and women that have gone from her farms. She needs their brains and sinews and most of all their sentiments of American liberty implanted deep in her soil. If they will return and apply the knowledge of modern agriculture which now lies open for them to possess, and will apply to the conduct of the old farm, these same business principles, without which they cannot succeed in any other sphere of enterprise, she will bountifully repay them with health, moderate wealth and true happiness.

Three friends, who had been spending an evening together at their club, agreed that the one who did not do the first thing that his wife told him when he got home should pay for their dinners. Smith, in trying to find the matches, trod on the cat's tail. "That's right," said his wife, waking up, "kill the poor cat and have done with it." "Well," thought Smith, "I will have to do it or pay"; so he killed the cat. Brown, in the dark, stumbled against the piano. "Why don't you break the piano?" demanded his wife. And Brown at once broke the piano. When Jones got home he stumbled on the top step of the staircase. "Go on," said his wife, "tumble down stairs and break your neck." "Not me," answered Jones, "I'll pay for the dinners first."

I have sometimes thought that if the farmer had fewer acres, would till them better, had less credit at the stores, would work fewer hours in the field, and give more attention to the detail and business side of the proposition, he might be more prosperous.

I believe that the value of skim milk and butter milk fed on the farm is very much under estimated. Skim milk and butter milk are utilized in a great many different ways: first, for human consumption; second, manufacture and sale as cottage cheese; third, manufacture and sale as skim milk cheese; fourth, manu-

facture and sale as condensed skim milk; fifth, manufacture and sale as wet or dry curd; sixth, use as feed for calves, pigs, poultry, etc. In the majority of the methods of utilization, there is a possible profit to the milk producers far in excess of 20 percent per hundred pounds. When the supply of skim milk is retained on the farm, I believe it can be made to pay as high as 40 to 50 cents per hundred pounds, especially when properly fed with other foods to balance the rations. I recall reading some time ago experiments made at the West Virginia station where it was found that with eggs at 20 and 25 cents per dozen, skim milk used to moisten the mash for laying hens would net 80 cents per hundred pounds. I have heard of poultry fattening concerns in the West paying as high as 75 cents per hundred for skim milk, and claiming to realize a profit on the purchase. I believe that a poultry fattening establishment, superintended by an expert feeder, could be made to pay in some of the creameries of Vermont, and pay the farmers more for their skim milk than the average farmer would be able to get, especially where he is ignorant of proper feeding methods. Some creameries are securing remunerative prices where they have a near-by market, by manufacturing cottage cheese or making dry and wet curd and selling it to the casein manufacturers.

At the present session of Congress there will be a very hard fight by the oleo manufacturers for the lowering of the national oleo tax. Every creamery man should circulate petitions among his patrons, and every Grange in the State of Vermont should draw up a petition to prevent the lowering of the national oleo tax, and should send it to their Congressman; and I believe this Association should pass resolutions favoring the maintenance of the present tax on oleomargarine and they should be sent to our Congressman. The Hon. George L. Flanders, President of the National Dairy Union, says: "Word comes from oleo headquarters that unless this tax is reduced, a bill will be introduced in Congress to put a tax upon butter containing artificial coloring matter."

A customer in a restaurant said to the waiter: "I do not want any butter on my bread." The waiter said: "G'wan, dat ain't butter."

There has been a great deal said about mother-in-laws; so I will tell of a conversation that I heard the other day. It seems that the mother-in-law of one of the gentlemen was ill and after they had been discussing her for some time, one of them said: "Well, what do you expect your mother-in-law to leave you when she dies?" The reply was: "Oh, if she only leaves the world, I'll be satisfied."

I am in much the same state of mind as was a certain preacher who had just accepted a call. His first sermon was well received by his parishioners. The next Sunday he surprised them by preaching the same sermon, but when, on the succeeding Sunday,

he preached the same sermon for the third time, their disappointment and disapproval could no longer be restrained. A committee was appointed to wait on the new pastor and invite an explanation. The answer of the preacher was that he had given precepts fundamentarily important in the sermon preached, and just as soon as they would practice these teachings he would give them something new. I have many times before in the Vermont Dairymen's Association talked on the question of creamery management, and if you will bear with me a few minutes, I would like to make a few suggestions along this line, which I believe would be helpful to the creameries in Vermont. The first requisite in the management of creameries is to make sure that the quality of the butter will grade extras, and this can only be done by getting the milk and cream delivered in proper shape to the creameries. There is, and always will be, a demand for butter of this quality at good prices by those who have abundant means to pay for it, and the demand for this kind of butter is far in excess of the supply. The competition of oleo is much less serious when butter of this kind is made, than with lower and inferior grades. Butter of extra quality can only be produced by business-like, not haphazard and shiftless methods. Good enough is an enemy to the best. It is a fundamental requisite that managers of creameries bestir themselves with intelligence and energy to provide for their creameries milk or cream that is clean and fresh, and see that the utensils and cans used in handling and delivering the same at the creamery, be clean, bright and free from rust. It is very important that the pipes in the creamery through which milk or cream flows, should be kept thoroughly clean, and that they be kept free from the accumulations of days, weeks, and, sometimes, even months. I believe it would be for the interest of the farmers in the State of Vermont, if cream and milk were graded, and paid for according to the grade; cream being graded into three grades, paying one cent per pound more for the second grade than for the third, and one cent per pound more for the first grade than for the second; the third grade of cream to be that which is tainted or sour—not placing the cream in this grade unless it is so sour that the farmers themselves can detect it; the second grade to be cream that is suitable for making butter grading extras; the first grade to be milk or cream brought in every day the creamery is running; and the creamery should run every day, at least eight months in the year, and then every other day the remaining four months if there is not milk and cream enough received to run every day. This cream will make an extra butter or good shipping cream, and the creamery management will get from two to four cents a pound extra, according to the quality of the butter and the season of the year. Of course, we would have to make two qualities of butter, keeping the third grade of cream by itself and churning the same separately. The receiving of poor cream at the creameries in this State is due almost, if not entirely, to the creamery managers themselves, and to competition

between the same. Some one has made the remark that competition makes us step lively in all lines of life, and a man even hustles to get the wife he has picked out for himself. Were the farmers to bring the creameries the same class of milk that they furnish the condensaries and milk trains, taking their skim milk and butter milk at what it is worth to be fed on the farms, I believe they would make as much money, and their farms would be in a more productive state than they will be by selling whole milk to the condensaries or milk trains, The State of Vermont is known as a great butter producing State. The grasses seem to give a peculiarly good flavor to the butter made within its confines. Spring water is available to nearly every farm and creamery in our State. It is not alone in quantity that Vermont excels, but also the quality of butter, which is very high.

I am very sorry to say that the quality of the butter made in the State of Vermont is deteriorating. This is caused by the shipping of cream from the creameries and by the use of hand separators among the farmers, instead of bringing the whole milk to the creameries as they used to do. I have repeatedly, in this Association, advocated the whole milk system for making butter over the gathered cream system, but I saw several years ago the beginning of the end, that there would be no use of trying to run separators in creameries in the State of Vermont in a few years. There are, especially in the northern and eastern parts of the State, at the present time very few, if any, whole milk creameries. This, as I have said before, is one of the causes why our butter in the State is deteriorating in quality. Also, the shipping of the best cream from the creameries, as many of us do, hurts the quality of the butter quite materially.

LIFE IS A FUNNY PROPOSITION.

"Man comes into this world without his consent and leaves it against his will. During his stay on earth his time is spent in one continuous round of contraries and misunderstandings by the balance of our species.

In his infancy he is an angel; in his boyhood he is a devil; in his manhood he is everything from a lizard up; in his duties he is a fool; if he raises a family he is a chump; if he raises a small check he is a thief, and then the law raises the devil with him; if he is a poor man, he is a poor manager and has no sense; if he is rich he is dishonest, but considered smart; if he is in politics he is a grafter and a crook; if he is out of politics you can't please him, as he is an undesirable citizen; if he goes to church he is a hypocrite; if he stays away from church he is a sinner, and damned; if he donates to foreign missions he does it for show; if he doesn't he is stingy.

When he first comes into the world everybody wants to kiss him—before he goes out they all want to kick him. If he dies young there was a great future before him; if he lives to a ripe old age he is simply in the way in living to save funeral expenses. Life is a funny road but we all like to travel it just the same."

REPORT OF SECRETARY AND TREASURER.

GENERAL FUND.

RECEIVED.

1909.		
Cash on hand at settlement, Dec. 19, '08	$ 76 88	
Appropriation from State of Vermont	1,000 00	
Vermont Sugar Makers' Association, their share of expenses holding joint meeting	67 75	
of F. L. Davis, secretary advertising money	242 00	
Membership dues for 1909	159 00	
Balance from pro rata fund	10 00	
Total receipts		$1,555 63

EXPENDED.

D. A. Perrin, P. M.	$ 14 00
Bogle Bros.	34 32
Waterman Orchestra	30 00
W. T. Becker	33 60
Van Ness House	157 97
Mrs. Marie Patterson	10 00
Orrin Bent, scoring butter and sugar	55 00
G. L. Cushman, scoring butter and sugar	55 00
Leon S. Merrill	46 66
W. S. Parker, Treasurer	88 86
W. G. Reynolds	6 50
Brown & Moore	13 75
Mrs. Edna Beach	5 55
P. S. Carpenter	10 00
Robinson Edwards Lumber Co.	8 90
Harry J. Nelson	4 50
F. L. Russell	11 98
W. J. Fraser	97 15
Landmark Job Press	4 00
C. F. Smith and wife	12 20
H. A. Edson and L. Kiley	6 00
C. A. Creed	8 00

Free Press Association	$ 12 00	
W. H. Harrington	5 00	
W. H. Harrington	16 82	
Mrs. G. A. Smith	59 50	
C. F. Eddy	11 50	
M. A. Adams	26 31	
Transferred to pro rata fund	239 48	
D. N. Perrin	28 00	
Capital City Press	98 30	
The Vermonter	8 50	
D. A. Perrin	6 00	
F. L. Davis, secretary	65 13	
The Landmark Press	2 85	
F. L. Davis, secretary	175 00	
D. A. Perrin	30 00	
Chas. R. Cummings	6 95	
Balance on hand	50 35	
		$1,555 63

RECEIVED.

1909.
Pro Rata Fund received as follows:

Jan. 8.	Orrin Bent donated	$ 5 00	
	Geo. L. Cushman, donated	5 00	
	C. F. Eddy for butter sold	242 40	
	Worcester Salt Co.	35 00	
	Alderney Butter Color Co.	10 00	
	Wyandotte Cleanser Co.	10 00	
	Creamery Package Co.	50 00	
	Wells Richardson Co.	10 00	
	Drawn from General Fund	239 48	
	Total received		$ 606 88

EXPENDED.

Paid for 419 1-2 points Butter @ $1.25	$ 524 38	
Paid for 26 points Cheese	32 50	
Paid premiums on Milk and Cream	40 00	
Transferred to General Fund to balance	10 00	
		$ 606 88

SECRETARY DAVIS: These vouchers have all been audited and approved by the Association auditor as well as the State auditor.

Upon motion of Mr. Bronson, seconded by Mr. Aitken, the report of the Secretary and Treasurer were accepted and adopted as read.

Wednesday Afternoon Session, 2 o'clock.

Reading of scores and award of premiums by Secretary Davis.

The exhibit of butter and cheese was smaller than some years and shows that more creameries and dairymen are shipping their product in either cream or whole milk each year.

The exhibit of market cream and milk was very small and unless more interest is manifested in this feature of the exhibit it will have to be discontinued.

The officers of the Association wish to thank all who exhibited at the meeting and the supply men who so generously helped to make the meeting such a success.

GOLD MEDAL AND CREAMERY SWEEPSTAKES CUP.

M. K. Bruce, Passumpsic..........................Score 98

DAIRY SWEEPSTAKES CUP.

H. M. Lee, Windsor ....Score 97½

MARKET MILK.

	Score.
F. W. Draper, Enosburg Falls, First prize, $6.00............	96½
W. E. Carter, Rutland, Second prize, $4.00.................	95½
A. E. Manley, Pittsford, Third prize, $2.00.................	94½
Fourth prize, $1.00, equally divided between	
R. T. Robinson, Ferrisburg, ...	92
and	
W. J. Powers, Brandon, ...	92

MARKET CREAM.

	Score.
J. W. Wiggin, Quechee, First prize, $6.00	97
F. W. Draper, Enosburg Falls, Second prize, $4.00	96
W. E. Carter, Rutland, Third prize, $2.00	93½
E. E. Smith, West Rutland, Fourth prize, $1.00	89½

Whole number of entries of butter	105
Highest score	98
Lowest score	88
Average score	93¾
Whole number of entries of cheese	6
Highest score	96
Lowest score	91
Average score	94⅓

SECRETARY DAVIS—Our President, Mr. Eddy, has renewed his generous offer of last year to present all persons who have scored 97 or over with a free banquet ticket, and I am pleased to inform you that Mr. Eddy will be asked to provide 16 such tickets.

HOW THE FARMER MAY IMPROVE HIS CONDITIONS AND INCREASE THE INCOME FROM HIS PLACE.

C. C. JONES, BENNINGTON, MANAGER OF THE FILLMORE FARMS.

Mr. President, Ladies and Gentlemen:

I have been asked to tell you how the butter was made that won the cup last year. I will run very quickly over the conditions as I think they should be, and as I try to have them in our barns, and as we have good men, we do come pretty near having the conditions as I shall name them. I don't believe it is worth while to have a cow unless she pays her board, and I don't guess whether she does or not, I know, and every farmer ought to know. It is a simple proposition. It is not scientific farming or dairying, it is sensible farming or dairying. We bring our cattle into a barn that is clean, we bed them clean, their udders are washed and dried. The milk is first started on the floor and then in the pail. I milk in an ordinary pail but it is clean and the milkers are clean. The milk is taken care of in a cleanly manner. After it is milked it is not allowed to stand in the cow stable to take up any odors that may be there. As soon as it is drawn from the udder it is taken to the creamery and if it is to be separated that is done immediately. If it is to be put in bottles for the milk trade, it is cooled and bottled. The sooner we get the animal heat out of the milk, the longer we keep it. The milk which we run through the separator and prepare to make into butter is taken into what we term our butter room. Just now we have not much of a dairy, but some day we will have what I consider a dairy. I work for a rich man, but while he is rich, Gentlemen, that place is run on a business plan from start to finish, and if it were not so run I wouldn't be on it for a minute.

I will now briefly tell you how the butter was made that won the cup last year.

FEED—Average daily ration: six pounds Union grains, thirty pound ensilage, twelve pounds mixed hay (some poor), this ration for the cows giving about twenty-four pounds milk daily. Some cows get nine to ten pounds grain and forty pounds ensilage. The average cost of this ration last year was from 23 1-4 to 24 cents per day. Cream was held 24 hours before set to ripen—test 35 percent. Warmed to 65 degrees and held at that for 36 hours, then cooled to 52 degrees and held 12 hours. Acidity of cream when put in churn, five-tenths of one percent. Time to churn, 55 minutes; it was washed twice in churn, using

water at 55 degrees, then taken from churn in granular form, salted at the rate of one ounce to the pound, worked lightly and left two hours, then worked and printed.

It takes with us about 18 pounds of milk to make a pound of butter. Average test for the herd for the year was four and seven-tenths percent, average milk production per cow for the year 6,489 pounds. The herd consists of upwards of 60 cows: about 25 thoroughbred Jerseys, balance grade Holsteins.

THE OLD STYLE FARMER AND THE FARMER OF TODAY.

Now the farming proposition looked at from a sensible standpoint can be seen in but one way. There has never been a time in the history of the country when farming showed for the man who toils on the farm the possibilities it does today,—never—and I am just Yankee enough to tell you that we have got God's own country to work in. There isn't a State in the United States that can beat Vermont and I will tell you how I know it.

I started when I was 20 years old to look for a place that I thought was just right. Unfortunately, I wasn't born in Vermont. If my parents had known what their offspring was going to think of Vermont they would have made it possible for me to have been born here. I have looked for such a place since I was 20 years old (now I am past 40) but I found the place I wanted—Vermont.

There were times, years ago, when the farmers—our grandfathers and forefathers here in New England— occupied the farms that are now abandoned. They not only made a living but they raised families and put money in the bank. Now then, were these men any better farmers than we? I will tell you what I believe is a fact, whether we want to acknowledge it or not, these men at that time had intelligence enough to grasp the conditions as they were and to improve the opportunities they had. The conditions now are very different from what they were then. There is an evolution in everything and the farm is no exception. In those days the candle was good enough; today, the electric light is none too good for the farmer, and I say if he could get something better he ought to have it, he deserves it.

There are three kinds of farmers: First, the shiftless cuss (and there is one once in a while). He is the man who leaves his machinery out and allows his buildings to run down, and you talk to him about testing his cows and he says he knows all about them, he don't have to test them; he don't believe in "bookfarming,'' this "scientific business.'' There is another fellow: The driver. He is a driver; he gets up at four o'clock and makes his wife get up about half past three and his hired man about the same time, and his wife and the hired man work until

nine o'clock every night. That man makes life a burden to his wife and a burden to his hired man as well as himself. He may make a little money but, Friends, the making of money is not everything. Money is worth only just what it will buy and there are lots of things it won't buy. It won't buy another wife just like the first one you had, and it won't buy the health that you used to have and it won't buy a whole lot of things you need to have in order to make this life really worth living. Then there is still another farmer: The moderate man. The man who can get up in the morning first, once in a while, and build the fire for his wife. That man knows tonight what he is going to do in the morning. He can very likely tell you right now what he is going to plant next summer and where he is going to plant it; he can tell you how much seed per acre; the kind of fertilizer and the quantity he is going to use. He don't have to get up at three o'clock in the morning. He has improved machinery and he takes care of it. His hired men have an interest in their work. We should not forget that our hired men are human as we are,— and there are a whole lot of us who have had to work as hired men and we ought to know how to treat them.

As to improving the conditions upon the farm. The first thing to take into consideration, in my opinion, is the keeping of our boys at home on the farm. You say that is a pretty difficult problem, but we can do it. How? By interesting the boy in the place. There isn't a farming proposition now with a boy in it, who takes any interest in the farm, who doesn't have something on the farm that is his. Don't give a boy a pair of calves and let him raise them and, when they become steers and he can work them, sell them and take the money. Give the boy an interest, give him something to take an interest in. If it is a girl, give her something that she may be interested in. There is nothing so pleasing to us as something that is our own, and individually our own, and it doesn't make very much difference what our age is, either.

There is once in a while a boy who doesn't care anything about a farm; well, that is all right, don't try to make a farmer out of him. There have been a great many good ministers spoiled by making farmers of them and, on the other hand, there have been a great many good farmers spoiled by trying to make ministers out of them.

I will tell you the way I look at it. Why have we scattered all over Vermont, and in fact throughout New England, so many abandoned farms? I will tell you. It is because right here in New England, right here in Vermont, they have robbed us of our men. Vermont has raised the sort of material the country has wanted. We have not only raised the best stock sheep, cattle and horses,— but we have raised the men the world needs. Look what we have furnished from the State of Vermont. Look through the Senate at Washington; there are many men there

from other States who were born in Vermont. Go into the State of Idaho and you will find 6,000 Vermonters in business. Look through the agricultural colleges in the West, experimental stations in the South and West, and see how many of the leaders and teachers came from New England. Ladies and Gentlemen, we started the right kind of seed; it was cultivated and taken care of in the right sort of way, but we haven't had enough men to keep up our section and at the same time help out all the other States.

There are a lot of good successful business man in the city today who started on the farm. They got on the farm what they could not get in the city, a constitution to endure what they have to endure and live as they do—about four years in one.

If there is any business in the world in which a man needs business methods it is on the farm that he needs it. One of the greatest things that we have to got consider is this: Every trade, and in all the trades throughout the country, they have their trade unions. When we buy fertilizers we buy from a combination of makers; when we buy sugar it is from a combination of sugar makers. Did you ever hear of a farmer going to a merchant and telling him how much a yard he would give him for his cotton cloth? He tells the merchant he wants five or six yards and he pays the price the merchant asks. Do you know what we need? We need a good, progressive man to take the lead in this combine. If we cannot make butter for less than $.35 a pound, then let us get $.35 a pound. We can do it. I don't care whether it is through a creamery or what it is, but if farmers know what it costs them to make a pound of butter and they know that they can not market it less than $.40 a pound, then get $.40. This country owes to you what it gives to every other man in legitimate business—a legitimate profit. If you cannot produce milk for less than five cents a quart wholesale, then get five cents. In other words find out what it is going to cost you to produce your goods. I don't believe in a combination that will rob any man, but I do believe in giving the farmer the same chance that all other trades have, and just a little bit better.

Now in regard to the middle men who handle our product after it leaves the farm. Where do they come from? If you go and look them over you will find that nine-tenths of them come from the farm. If the farm can furnish that sort of material to the city, why not use it while it is one of us and cut out this middle man business?

We produce milk and butter and a creamery man says to us, "We are going to give you so much for your cream; we will give you so much for your milk; butter is worth so much." Every other man who produces an article puts a price on it, and sells it at a legitimate profit, but we have got to take what the other fellow thinks is legitimate profit for us. The time has come for us to get on the other end of the halter; we have been led long

enough. Now let us take a hand and get in line and tell the other fellow what he is going to pay.

There is everything being done for us. The Government is doing lots of good things; spending large amounts of money teaching us many things; and I fear they are trying to teach us many things that we don't learn. Now, Gentlemen, I don't believe in absolute bookfarming, but I don't believe that any sensible farmer can afford to let go by him what the scientific research of men that are in that business have found out for the benefit of the farmer. As I say, the government is doing a lot for us; our experiment stations do a lot, but, Men, they don't go at us right and I am telling you why,—in my opinion. Their reports and articles are sent out promiscuously. They go to farmers all over the country. We can get them and all we want of them at any time, but I tell you, when we have done a full day's work on the farm, that sort of stuff gets pretty dry after we have read it about fifteen minutes. The consequence is about one in twenty of us read it, and the other nineteen don't know what it contains. If the Government would send out a man who would go over to Brown's place and stay with him a while and find out the good practical things Brown is doing, and then if he would go over to Jone's place and tell him what Brown had been doing, Jones would be pretty glad to have him. I believe that is along the line where some money can be spent for our good.

Education is all right. We need it, but if I wanted to make what I consider a first class farmer out of a boy and were asked to choose between an agriultural college and actual experience under an agriculturist on a farm, you can have your college, your cigarettes and your nice dress suits and all that sort, and I will take the fellow with the experience. Maybe he won't have just as good a polish as the fellow with four years in college, but he will have the stuff inside of him, and that is where I want it.

Now let me tell you right here, our girls right in our home places are responsible for a whole lot of our boys leaving the farms. They are so apt to prefer the boy from town because of the cut of his clothes. The farmer boy may not dress or look as stylish, but there is apt to be more good stuff, perhaps, in that rough suit of clothes, and what we are looking for and want is what is inside the boy and I want it particularly in the farmer.

Now experience is one of the best teachers we can have. The tuition comes mighty high sometimes, but whenever we pay high for experience we remember what we get.

There is one point that I think as farmers and dairymen we ought to consider. I have spoken of combinations and that sort of thing; about what the Government is doing, and I could say a whole lot of other things I wish it were doing, but we can do one thing. The State of Vermont, and the welfare of the State is is dear to each of us, and I want to tell you it is just as dear to me as to any man who was born here or who has lived here all his life.

Vermont is mine by adoption. I tell you you have got to know what you are doing and you cannot succeed on a farm unless you keep a strict account. Farm bookkeeping is one of the simplest things if properly handled, and it is one of the most complicated if not properly and systematically kept. I can tell you, and there are many other men who can tell you just what it costs them to keep each cow during the year. I can tell you just what it cost me to feed my sheep last year; just what the labor cost me; just what every expense was, and I can tell you the returns. It is not a question of guess, I know; and that is what every farmer should know. He must have system and a systematic keeping of accounts.

Now then, I am going to take up for a few moments a subject that is just about as close to me as the subject of Vermont, and that is sheep. Vermont was the State in all the United States at one time in which to find wool sheep. When I was in Texas we came all the way to Vermont to buy our stud stock, and we got good ones. Why? Because they were raised in Vermont. We have in this State the facilities for producing the best stud sheep that the world knows. Why do you go to England to buy stock? You say, because to start with, the stock must come from somewhere, but I am not going to acknowledge that there is a man on the other side, who hasn't been in the sheep business any longer than I have, that can beat my breeding of sheep, or the breeding of anything else. We have the facilities for raising that stud stock, but, of course, we cannot all be raisers of thoroughbred stock. There is plenty of room at the top and those men who raise thoroughbred stock and keep at the top are the ones who can get the price for their product. There is a grade of sheep we can handle here more profitably than in any section of the United States, and that is the so-called "hot house lamb" which is not a hot house lamb at all. It is a fall lamb and there is no place in the country where that lamb can be produced cheaper or any better than right here in Vermont. In New York City the demand every year is beyond the supply and the man who cannot raise a lamb in from nine to twelve weeks and sell him profitably for $10.00 has something wrong with him. The trouble is not with the sheep. I commenced to ship to the New York markets last year, the 21st of December, and continued from then until the 10th of February. The least that I got for a lamb was $10.20 net. These lambs were not sold to private customers, but were sold through a commission man through open market just where any one of you could sell them, and they were raised just as any one of you could raise them.

Gentlemen, that is worth thinking about; you claim your pastures are running down. Why? A great many of them you cannot plow. What will work them any quicker than sheep? I don't know of anything. If I want to raise a piece of potatoes on a mountain piece I put sheep on it to start with. I don't

recommend that any man should go into the thoroughbred sheep business, but I do recommend that he start with the best ram he can buy; taking simply a little bunch of sheep and running it as a side line.

The first thing we will consider is a place to keep them, and a great many men think they cannot raise sheep because they have no good place to keep them. They complain that dogs kill them. You cannot expect to put a flock of sheep on the side or top of a mountain and allow them to run wild, with no looking after, and once or twice a year bring you down 50 percent of your money and you sit in the house and take it. Sheep need attention the same as any other animals, and if you work the business properly, it will pay you to buy wire to fence in a piece, and in that way you will protect the sheep from the attack of dogs.

I will give you a brief estimate of the cost of a flock of sheep:

35 head of young ewes @ $8.00	$280.00				
1 extra good ram	45.00				
	$325.00		First cost.		
Grain 150 days at two cents per head per day			$108.00		
Hay for same length of time			36.00		
			$144.00		
Income, 35 lambs @ $8.00	$280.00				
Wool 234 pounds @ .28	65.52				
	$345.52	-	$144.00	=	$201.52

Over five percent on $4,000.00.

The question is "Where is the best place to make a success at farming?" I answer, "The best place to make a success at farming is right where you are." The man who sticks to his post is the man who succeeds. They have a mighty nice country out West; it is so flat you can see for miles and there is perhaps a rise of a few inches to the mile, but don't forget that when it rains you are deep in mud for weeks, and then, when it don't rain, and the soil dries and blows away, you wish you were back in Vermont. Let me tell you there isn't anything they can show you anywhere in God's world that can beat what we have right here in Vermont. Where can they beat our scenery? Where can they beat our women? What do you want that you can't get in the State of Vermont? You can get everything you want right here if you stick. Stick to Vermont; stick to New England, and let us all stand together, shoulder to shoulder, and put the Vermont farmer, the Vermont dairyman and his good wife right up there in the front at the top where they belong and keep them there.

SUCCESSFUL DAIRYING.

F. WARREN WIGGIN, MANAGER OF QUECHEE FELLS FARMS, QUECHEE, VT.

Mr. President, Ladies and Gentlemen:

Ex-Governor Hoard says that if dairy cows could talk they would be holding conventions pleading for a new set of dairymen, and I believe that success or failure in the business of dairying depends not upon the business but upon the man. There are three things which I wish to speak of and which I think are of relative importance in successful dairying: The Man; the barn; the cow. The Man is first, he is in the Barn; and the Man is with the Cow. Without that combination I do not believe there is any such thing as successful dairying.

We see men in business succeeding; we see men in business failing. We see men in hotel life that make a failure of it; we see men in professional life that make a failure of it; we see men in the dairy business making a failure of it. I think it is a fundamental principle—and I would like the approval and indorsement of every man in the audience in the matter, that when ninety-nine men can succeed in any line of business, and one man fails, that the reason for that failure is in the man and not in the business. If we, as dairymen, are not succeeding in our chosen calling, there is only one thing to do and that is get out of it. It is not the fault of the business; it is the fault of the man.

There are three things that a man to be successful in dairying should possess, and they are easy for you to remember: Grit, Gumption and Grace. If a man hasn't Grit enough to make up his mind he can and will attend to business, then he should not have any business. If he has Grit, he needs Gumption, because he must keep everlastingly at his business and pretty lively, too. Then he needs to have Grace. That is the one thing above all others that I would like to impress upon the minds of men who handle cows. Did you ever know of a man to go into the kitchen and catch his wife by her arm, whirl her around, give her a box on the side of her head, and say, "Jane, I want something to eat"? If a man should do that and Jane had the gumption she ought to possess, a broom stick would soon be called into duty and the man would get out of the house more quickly than he came in. Do you remember how we used to treat our best girls when we went to call on them? Didn't we sneak up with a bunch of pinks or roses and a box of candy or sweetmeats and didn't we put on our most taking way? Speak to the cow as you would to a lady and you

will fill the pail the sooner. The cow will switch her tail, I don't blame her. There is no use to swear at her, and she will sometimes lift a foot when your finger-ends press a little too hard as you draw that golden fluid, but if you lift your foot the fat is in the fire, and you'd better quit the business. A little stroke of the hand, a quiet tone of voice, and you have accomplished a great deal. I have found in my experience that if I went into the house and wished a little favor of my wife, the best way I could make sure of getting it was to throw my arm around her neck, and possibly place a kiss on her cheek as I used to when courting her. What woman will not respond to that treatment? Perhaps you have never tried, perhaps some of you never kiss your wife; if you do not, better begin right now before you go home. I don't want a man in my barn to take care of my cows and milk those cows who does not love them. I love the cows, I love the business, and when I go into my barn and speak, forty-four cows will turn their faces and look toward me as much as to say, "Yes, we know that voice." And I have never milked one of them, either, but there is not one of them but has had a caress from my hand. Last summer I had a bunch of young stock on the hills and every day I used to drive up to see them and I would take a little bucket of salt or grain—the lot where they were is half a mile long and 8 or 10 rods wide—I would stand at the entrance and call, "Come, Pets! Come, Babes!" Pretty soon you would see a head and then a tail raised and then the whole bunch of a dozen or more beautiful young creatures would come like the wind and nearly run over me. I have heard that some people said, "That Wiggin is a fool to spend his time in that sort of way." Do you think so? I have got some dairy cows coming there and when those cows get out in the pasture in the summer time and I want to bring them in for milking, all I have got to do is to go to the bars and sound out "Hello, Babes!" "Come, Pets!" and every last one of them will come scurrying down in response to my call. That is what I call, in brief, graciousness in taking care of our cows, and without it, Men, you cannot get the best results. Friends, treat the cow as you would treat your wife,—or, as you ought to treat your wife,—as you would treat your sweetheart, and you will get good results. Kindness will do more for the dairy cow than almost any other thing.

Another thing is cleanliness. It is necessary for successful dairying. One point I wish to impress upon my hearers is that successful dairying depends upon the attention given to the details of the business, and accuracy in the work. Believe me, there are no cross-cuts to successful dairying; the road is a straight one, and all the details and all the minor elements must be closely attended if one would succeed.

Another essential is the stopping of all waste. Stop wasting feed. As has been suggested to you by another speaker this afternoon, there is no other way to stop wastes than by knowing

what each cow produces and how much you need to feed her to produce the result you wish. In my barn every cow has a number and in front of her stanchion every two weeks is placed a card. On some of these cards it says "2-15-3." On some others "4-20-6." What do these figures mean? In the latter case it means that that cow shall have four pounds of grain mixture in the morning, 20 pounds of ensilage—that comes twice a day—and at night she is to have six pounds of grain ration. The cow that has the first set of figures on her stanchion has two pounds of grain in the morning, 15 pounds of ensilage twice a day, and three pounds of grain at night; the hay ration is from 8 to 10 pounds for each cow. If I were to give to the small milker as much feed as to a large milker I would be wasting my feed—the waste would affect not only the dairy but the whole farm. Stop the waste and you have gone a long way toward success.

One important thing is to have the right ideal. Do you know what makes life worth living? Is it the drudgery from day to day? No. What is it? It is the simple fact that a man has got an ideal in his mind; he has pictured to himself a summit to which he will climb. God pity the man who simply works to get a living. It is the most miserable kind of life a man can live. If I might be able to impress one thought upon the mind of every boy and girl in this land, it would be this: Place an ideal ahead of you—something worth being; something worth having; something worth dying for. Then get there or die in the attempt. Now those of us in the dairy business have an ideal of what we want a cow to be. Can you draw in your own mind a picture of the animal you like best? Just one? If so, keep that ideal before you until every animal in your herd corresponds to that type, and you have a pleasure in your work all the time.

When I took charge of the herd on the farm where I now am, there were cows red and white, some blue—or the milk product was—some red and black; some were large, bony, homely, ugly—good producers, perhaps; others were small, so small one could almost wear them as watch charms. I said to the owner of the farm, "Do you like the looks of that line of cows?" and he said he didn't but that he hadn't been able to get hold of a man that could weed them out and do anything with them. I told him if he wanted them weeded out I would undertake the work. During the past year we have sold out of that herd over $1,400 worth of cows. We have brought in some heifers, sold some heifers, and now have more cows on the plantation than a year ago, but the cows we have there now are cows—we have 22 which if you were to look at them when tied and think you would know them the second time you saw them, when turned out in the pasture you would not know one from another. Is there any satisfaction in it? I think there is. We propose to keep on that way; that is our ideal. It may take five years to accomplish the result we are looking for, but so long as the prize is held before us we

have something to work for and we can see that we are drawing nearer and nearer to the goal, and the satisfaction grows greater every day.

A dairyman must practice thinking, real business, common sense thinking. Why is it that so many of the men who leave their city office work and places of business and go into the country and buy farms and settle down, prosper and succeed so well? It is because they bring the business system of the city to the farm life. Every farmer ought to be business man enough to keep books and accounts and know just what he pays for his cows and what, in turn, his cows and each individual cow pays him. He ought also to know to a penny what his hogs cost and his sheep, and every animal he keeps on the farm. It is the only safe way to conduct a farm.

A dairyman should also be a commercial man. I was interested in what Brother Jones said this morning along that line, and I felt like saying a good loud amen to every word he uttered. The sale of the products is more than the getting of them. The custom has been in the past that the farmer and dairyman have accepted what the public offered. I have had a little experience along that line. Our cream goes to—I guess I won't say who. When I went on the farm a year ago last November, the dairy produced about 14,000 pounds of milk that month, testing five percent; they got from that milk only 595 pounds of butter fat, allowed by the creamery. I took the matter up with the creamery people and told them that I should test every bit of cream that went to them, which I did. Last year—I figured it up a short time ago—the result from the creamery was that they received 1,275 pounds less of butter fat than what the test of milk showed they should have received.

I tried to get a little bit of good business method into the thing, and the result the past year is that we have received pay for 59 pounds more of butter fat than what I could show the milk showed we ought to have had, and only the other day when I got my November check—and I had just as soon tell you they paid only 34 cents during September and October—I sat down and wrote them that they were paying me only 34 cents during the last few months and that was one or two cents less than first class butter was selling at in the markets and that as we were giving them a first class article, I thought we ought to receive more than we were getting. The reply was that the Boston Chamber of Commerce in the September quotations gave assorted sizes creamery tubs for Vermont at 34 7–10 cents, for October 34 4–10 cents and November 34 cents; only 3-100 of one percent difference for the three months, and that they had been paying us 34 cents for butter fat and they thought they had done wonderfully well. I immediately wrote them that I was not at all interested in the quotations of the Boston Chamber of Commerce for Vermont's assorted sizes dairy or creamery

tubs; that it was not the kind of butter fat I was giving them; that I churned the other day 30 pounds of cream, and I could make the Babcock test only show 43 percent, but I got 18 pounds and 12 ounces of unsalted butter; that I had been sending them a first class article and in quantity almost two tons of cream during the time and that that amount of cream had made for them nearly one ton of butter, and that for this they would receive $700 or $800 but I could have possibly $300 or $400 to pay the feed bills and do all the hard work. I also said that I supposed I would be obliged to take what they offered until the road changed, and I suggested that no road was so long it never changed or turned. I was amused at their reply, "We are going to pay more for December cream than we did for November." I leave this brief statement of my experience with you for what it is worth.

I wish to enforce and impress upon your minds the necessity of *graciousness* and *kindness* toward the cow, and *cleanliness* and the *ideal*. Never lose sight of that ideal. There are hundreds of dairymen who are making a success in their line of work—the gentleman who preceded me is a sample, and there are more, many more scattered throughout New England. If a man can succeed in dairying I believe it is the noblest and grandest and the most interesting profession that ever a man followed. If a man would succeed in this work he must keep the barn and the cow clean, scrupulously clean. He must have pure air in the barn if he is to make inroads against tuberculosis. We have the best air in the world right here in these hills, and the water from our hill springs is pure,—what else do you need so much to make for good health in the human or animal life? Ventilate your barns well; let the fresh air in and the foul air out so that the lungs of the cows may be strong and well to do their work. You hear men speak of building barns with so many cubic feet of space to a cow. I don't care for that method, I would make the barn compact, so that it may be convenient to work in; the more compact, the more thorough should be the ventilation—if you have sufficient pure air, you need not worry about the size. Let in the sunlight. Now the cow must be a chosen cow, a cow of dairy type. I wish somebody could put a quietus on this talk about a dual purpose cow. You want your cow thin over the shoulder, a great big paunch or barrel, a tortuous milk vein, a big, strong, jaw showing she can eat what she needs—a cow of dairy type. If you have a well-ventilated barn and a man to care for the cow and the barn, there will be no trouble in the dairy business. Be sure of the dairy type.

Several years ago the Minnesota Experiment Station made an experiment to demonstrate what the dairy temperament in a cow will do. This experiment was so simple and yet so emphatic that it turned the method of farming in Minnesota from grain and hay farming to dairying. They took wheat worth at that time $.40 a bushel and prairie hay worth $4.00 a ton and fed them

to a grade cow of Jersey and Guernsey breeding, of strict dairy type. That cow returned them $1.40 per bushel for the $.40 wheat and $14.00 per ton for the $4.00 hay. They then fed the same material to a dual purpose cow and she returned them $.80 for the wheat and $8.00 per ton for the hay.

This experiment has been confirmed by many other stations and demonstrates two things beyond question:

First. The most profitable way to market your farm crops is by feeding them out on the farm.

Second. By far the most profitable stock to feed is the cow of distinct dairy type.

In conclusion, the best thing you and I can do in the dairy business is to get down to that point where we use the Babcock test and weigh our milk night and morning. Then thin your herd. Sell them honestly, but get rid of them if you have to cut their throats. I was offered $75 for a certain cow in my herd only last spring; she has worked her own ruin and now has gone into the beef barrel. Keep up the testing and weighing until you get two cows into the hide of one; two quarts of milk where you formerly got one; two pounds of butter fat, where you formerly got one. Success or failure does not depend upon the number of acres of land that you cultivate, nor upon the number of cows that you keep, nor upon the rushing you do, nor the getting up of the wife and hired man at 3.30 o'clock in the morning. Your success or failure depends upon your own character; upon your own intelligence; your own application to the work at hand; upon the business principle or management that you put into the place. The men who take time to think and time to read and then have the grit and gumption to go out and put their thought and their reading into reasonable, careful, wise execution are the men who succeed, not only in dairying but in any other line of work to which their hearts lead them.

GLEANINGS OF THE MILWAUKEE DAIRY SHOW.

J. B. CANDON, PITTSFORD, VERMONT.

The title of my paper should, perhaps, have been "Some Impressions of the Milwaukee Dairy Show." My first impression was—never having been west of Albany before—that the maps when I went to school gave me a wrong idea of proportions. You know Vermont has a page all to herself, the Central States has a page and everything west of that, another. Well, after riding

all day and all night and then be told I was only about one-fourth of the way to the Pacific Coast I began to see that Vermont wasn't the "whole thing" after all, and then the Dairy Show—why it beat even our friend Davis's State Fair!

The Auditorium is an ideal place for such a show, with a seating capacity of between eight and nine thousand and plenty of room to house the six hundred or more of dairy cattle—splendid specimens of the different breeds—which were on exhibition, besides a working creamery, cheese factory, a very good restaurant and exhibits of all the different machines a dairyman or creamery man is likely to use for the next ten years.

Being a dairyman, realizing that the greatest aid to a dairyman's success is a good cow, the chief attraction to me was the cows—and bulls—I say bulls, because I am getting to be a disciple of the late Hiram Smith, who said, "For a dairyman, there is no greater educative influence than the owning of a thoroughbred bull.''

The splendid old Jersey cow, Jacoba's Irene, occupied a booth in the arena, and gave birth to a calf during the show; the little fellow and the mother attracted more attention than a royal baby.

One thing which impressed me was the similarity in form in the winners among the different breeds; there was a difference in size, difference in the color of the hair, etc., but in the general form there was a strong resemblance; the prominent backbone, high and broad at the pelvic arch, large barrel, plenty of room for the udder, very little round steak, and whether they were Holstein, Ayrs, Guernsey or Jersey, they all had these general characteristics; and, Gentlemen, it is not the type which the buyers for city markets hold up to us as an ideal, Now, which is right, the type of the drover or that which our most successful breeders seem to be striving for?

One exhibit which impressed me stronger than any other feature of the show was called "The Demonstration Herd''—it was a herd of cows taken from a nearby farm and the idea was to show the value of cow testing associations. The feed of each cow was weighed and charged to her at the market price and she was credited with her daily return of butter fat, the milk being weighed and tested each milking. These results were written out on a sort of bulletin board at the head of each cow. Some of these cows were returning as high as $2.00 for every $1.00's worth of feed consumed and some as low as 79 cents. Now these high producers had, as a rule, the pronounced dairy form of the thoroughbreds; while one of the low producers was what the drovers call a good market cow. She was large, straight back, fairly large udder and a good cut of round steak. I noticed one very ordinary looking cow which showed a good profit, while some that had very good dairy forms were mighty disappointing in their performances. Gentlemen, if that demonstration could be

brought home to the members of this Association, I don't believe we could get men enough to take charge of testing associations next year.

This work was in charge of Mr. Helmar Rabild of the Dairy Department at Washington, whom many of you will remember from our last year's meeting.

The thought came to me that we are not getting one quarter what we might from the painstaking work of these able men; not only those connected with the National Department at Washington, but also those of our State Agricultural Colleges; not the least of these is the little man at the head of our own here in Burlington, who with his able corps of assistants is doing splendid work, and at the risk of shocking his modesty, I say that Vermont is, and has reason to be, proud of Professor J. L. Hills.

Another very important feature of that meeting was the men one rubbed up against. Did you ever notice that the men you meet at dairy conventions are apt to have just a touch of the big head, or do I see a reflection of my own condition? They are apt to think they are doing a little better than the average of their neighbors. It is interesting, this coming in touch in a social way with these men. Occasionally they are willing to tell us how they accomplished these good results. One of these whom I met was getting an average of 11,000 pounds of milk in a year from his cows; he belonged to a testing association; raised his own cows; and his practice was this: as soon as a cow was thoroughly dried off he put her on a grain ration equal to that which she would receive when in milk. You may say that costs a lot of money and she could get along on ensilage and hay, or if hay is short, on one feed of straw. Yes, Gentlemen, she can, but she won't give you 11,000 pounds of milk in a year. The fact is we are apt to try "hoss-trade" methods in caring for our cows, we are not honest with them; but we can't cover up underfeeding and careless handling in any way to fool the old cow. If pastures are short in August and September we must feed in the stable or suffer the consequences; and the effect of underfeeding in the late summer months will reach into the winter and I believe, in the case of a heifer freshening for the first time, will effect her whole life as a cow.

Just one more impression, Ladies and Gentlemen, and I will close. The morning of October 20th one of the Milwaukee daily papers had the announcement in big print, "The Stork Visits the Dairy Show: Jacoba Irene gives birth to a calf, Dr. So and So in attendance." And up in the corner was a picture of Jacoba Irene? Oh, no. But a high headed, red and white Ayrshire cow. A nice looking cow, but what I wish to call to your attention is that we can't depend on the daily newspapers for instruction in dairy work. The editor of an up-to-date, daily paper is too busy getting news to spend much time on dairy problems, at least judging from the amount and variety of news which they serve up to us they must be, and when we are treated to a

bit of Dairy Gospel it is apt to be because they are short of news. Here is a gem which I selected from one of Vermont's leading dailies:

"Vermont, one of the best grazing countries in the Union, must consider her ability to raise beef. The eternal dairying must soon be supplemented by the raising of beef cattle. The Vermont buttermakers must develop a dual purpose cow.

"The day of the bovine machine, that produces so much butter fat per day until worn out and thrown aside, must be followed by that of the cow whose male offspring can be fed for beef, and who, when her best milking days are over, may be fattened and killed at a figure that represents very nearly the original investment.

"The Vermont dairyman who is abreast with the sign of the times will have his eye on this type of a cow and get a handicap on the future."

That editor undoubtedly would also raise a dog who would be a good cow-dog week days, tie a yellow ribbon around his neck and make a lovely lap-dog for his wife Sundays, and one that would track foxes pretty well in the late fall. He would also have a 1,600 pound draft horse that would easily win in the free-for-all at the County fair.

I freely admit there are good profits to be made raising beef in Vermont, but I seriously question whether the best profits will be made with steers raised from good dairy cows. If our business is worth following it is only justice to ourselves that we get the most reliable knowledge possible of our business and this is best gotten through some of the weekly publications which make a specialty of our line.

DISCUSSION.

MEMBER: What has the speaker's experience been in the raising of succulent feeds to feed the dairy without the expense of putting them into the silo and carrying them over a year, say in raising Hungarian or something similar at a less expense?

MR. CANDON: I don't know of anything I can grow as cheaply as ensilage, for the reason that Hungarian millet, green peas and oats are at their prime so short a time, and the expense of a team and a man to gather and feed them at the time they should be fed is too great, I believe, to encourage the growing and feeding of same. We find we can put in ensilage cheaper than any other feed we can get.

MEMBER: What kind of corn do you use?

MR. CANDON: The Sanford, rowed both ways, three feet apart.

MR. WIGGIN: Don't you think it is a good idea to feed the

dairy cow and the growing heifer a small grain ration and never drop it entirely?

MR. CANDON: I am trying to convert myself to that method of feeding; and am sure I should succeed if I didn't see the grain bills so often; but I *do* think it pays.

WORK OF THE CREAMERY AS I FIND IT.

N. P. HULL, DIMONDALE, MICHIGAN, PRESIDENT AMERICAN DAIRY FARMERS' ASSOCIATION,

Mr. President, Ladies and Gentlemen:

I am especially glad to be with you this afternoon. I have met with and talked to the dairymen in seven different States this year so far but this is the first Vermont audience of dairymen I have ever talked to. They tell me that you have the largest association of dairymen in the whole country. We supposed over in Michigan we had the best but, as I am in Vermont, I am going to raise my hand with you and say you have the largest as well as the best. I wouldn't give a rap for a man that didn't think and say he lived in the best State in the Union, in the best county, and the best township, that he has the best cows, and above all the best and the sweetest wife. I admire such loyalty.

I have wondered why Vermonters should ask a man from Michigan to come to their State and talk to them about creameries. Since I have been in this meeting and heard different men tell of their experiences with the creamery business I have come to the conclusion that the men of Vermont are very similar to the men in all the States where I have been.

The creamery is one of the principle methods of disposing of the dairy products. There are other methods, of course,—the ordinary city milk supply, the cheese factory, the condensary.

I didn't come here to tell you how to run your farms, but there are a few general principles that I believe are as true here as in Michigan, and one is that every man who lives on a farm, no matter whether in Vermont or Michigan, ought to keep before him two distinct propositions.

First: That we want to sell as many dollars' worth of products off our farms as we can, which shall carry with it the largest amount of profit.

Second: Every man should handle his farm so as to maintain or increase the fertility of that farm.

We talk a great deal about keeping our boys on the farm. If we would do so it is "up to us" to not only maintain but double the fertility of the soil of our farm, and leave our boys a heritage of which they will be proud and from which they will never care to go. If we would succeed in doing that, we must adopt some line or lines of livestock that will feed on the roughage of the farm, in that way taking good care that the fertility is kept in the soil. The majority of the ordinary farms cannot depend upon commercial fertilizers alone and we cannot afford to plow in the clover, so we must adopt some plan of getting and keeping the right line of livestock. If so, what line ought we to adopt? I have tried them all and I find there is nothing like the dairy cow. Then, if we want to go to the limit of conserving the fertility upon the farm, making the grass better, the best way of handling that product is to sell the butter fat, and I say the butter fat alone, keeping the skim milk on the farm and feeding it. They tell me that every ton of butter sold off a farm carries with it eighty cents' worth of fertility, and that is all. Don't understand me that I say a man ought to sell his milk to a creamery. Not at all, but what I wish to impress upon your minds is that you keep the skim milk on the farm, for when you dispose of that you are disposing of quite a share of your fertility.

When corn is worth 70 cents per bushel, 100 pounds of skim milk will take its place or make as much pork as will a bushel of corn, if judiciously fed in connection with other feed.

If, then, the skimmed milk is of so much value to keep on the farm and we are to make our product into butter, I am satisfied the creamery is the place to make it, By taking the cream to the creamery you are taking from the farm a large amount of work which otherwise would fall on the housewife, and I actually believe that the farmer has the best end of the proposition,—I don't tell my wife that, but I honestly believe it. You see the farmer has many changes of employment, while in the house there are three meals to be prepared each day and 365 days in the year, washing and ironing once a week, 52 weeks in the year, and spanking the baby oftener. A man should value the companionship of a good wife too highly to allow her to spend her time making butter and doing similar heavy work. Of course, there are some men with a good equipment for making butter and with a special market where they can afford to put in the time themselves in doing that work, and the fact that they control the product from start to finish, all the way through, is a reason why they can produce a better article, and many men take pride in doing that, and when they get a good price, as they may in a private market, it is all right. But I contend that the ordinary farmer should have his butter made at the creamery so as to take the work out of the home, and in most cases the quality and uniformity of the butter is improved. In the Detroit market dairy butter sells for 24 cents and creamery for

35 cents. As a rule you will find the creamery butter in the commercial markets brings from 3 to 5 cents more a pound than dairy butter.

The success of the creamery, as I have seen it, depends upon the equipment of that creamery. It should be properly equipped. I presume most of your creameries in Vermont are gathered cream creameries. Every creamery should be equipped with modern machinery and the butter maker should always have complete control of the situation and have every facility necessary for the producing of the best article possible. The ability to properly sell that butter produced is a part of the business ability of the manager of the creamery.

But the greatest proposition is the art of making the butter properly. The butter maker must be a man who understands his business fully, a man who loves his work, if he is to succeed. Then, you will understand that no butter maker, no matter how good he may be in his art, can take a poor quality of cream and make a first class quality of butter. So, the success of the business depends, not alone on the creamery or the butter maker, but very largely upon the patrons and their honest desire to help make a success of the business.

Another thing is necessary if success is to continue—*creamery inspection*. If you have a clean barn and are a good dairyman you need have no fear of inspection; and if you are not a good dairyman you ought to be inspected, the sooner the better. It is not a difficult thing to reason out on our part that if in a group of ten dairies, nine of them are kept clean and the cream properly cared for and delivered to the creamery at the right time, and everything all right, and the tenth dairy is wrong, that wrong one will cause trouble for the other nine and the entire product will show the result of carelessness on the part of the one. With an inspector to look after that one dairy and dairyman you will get better results and every one interested will be better satisfied. I tell you it pays to have a creamery inspector. It also helps in the way of giving the dairyman the knowledge that his cream will not be accepted by any creamery. That has been the old dodge, that the creamery man said if he didn't take the cream of a certain customer that the customer would take his product to some other creamery. Creamerymen, don't be afraid to refuse an article that is not right; if you accept cream that is off in flavor and dirty, and otherwise bad, you will not be the gainer but rather the loser by a good bit. Then, on the other hand,—I don't know how many butter makers are here today—I have been in creameries all over the State of Michigan, and in some of them I found the farmers were not the ones at fault; I found a most shocking condition of the utensils used at the creamery; the pipe to carry the fluid nearly closed and it probably had not been cleaned during the season. Then I didn't wonder the butter maker was in a serious trouble and couldn't make good a article. It didn't make any difference how

pure the milk or cream was before it entered that pipe, as soon as it passed through that it was contaminated for all time, and the damage was done for good and all. Then in other places I would find the skim milk tank dirty, and I informed the man in charge that the machinery and utensils must be cleaned before any more milk or cream was delivered.

Men, the first great thing to do is to see that your own premises are clean and sanitary and then you can ask the creamery man to do the same with his premises because you have set him an example. The example you set him and others will work to a much better advantage than any hollering or groaning you can do.

I have been to butter makers and asked them to be more painstaking and careful in their work, and have been told that if they were paid more money they would be willing to do their work better. If that is the feeling a man has about his work the sooner he gets out of it the better, and I would like to tell him so. If you haven't enough interest in your work to be willing and want to do it the very best it is possible to do it, then you'd better look up some other employment that you can put the whole of your strength and ambition in and try and make a success of it.

What we need in America is not so much a better cow but a better man to care for the cow. When we get the better men the better cows will come.

DISCUSSION.

MEMBER: I would like to inquire of the speaker in regard to feeding skim milk to hogs.

MR. HULL: My experience has been this, that when corn is worth 50 cents a bushel, a hundred pounds of skim milk will take the place of 28 cents' worth of corn; about three parts of milk to one of corn.

PRESIDENT EDDY: I find that buttermilk is worth pound for pound for hog feeding about half. I tried to sell buttermilk for 10 cents a hundred but couldn't and decided to feed it to hogs, and I find this year my buttermilk is going to net me 8 cents a hundred feeding to hogs.

MAKING OF PRIZE BUTTER.

C. E. ROBERTS, MILTON.

Ladies and Gentlemen:

At our last dairymen's meeting, when I was awarded the Creamery Sweepstake, our secretary obtained a promise from me to write a paper to be read at this meeting.

As he has given me the privilege of choosing a subject, I choose to speak to you on the making of prize or premium butter, as I feel more at home on that subject.

I have nothing new to tell you, just an old, partly worn-out story which I shall repeat in the hope that it may have some influence in helping to improve the quality of the milk and cream that is delivered at the creamery. If we can get our rural patrons interested in the creamery, we can also persuade them to take good care of their milk and cream as this is the foundation of good butter-making.

The first essential is a herd of healthy cows, fed proper food and housed in a well-ventilated and well-lighted barn. The milker should be clean in person and clothing, and milk with dry hands.

The milk should be removed from the barn as soon as possible and cooled to about 50°. If the milk is separated on the farm it should be separated at once, while it is still warm. The separator should, of course, be washed every time it is used. The cream should be cooled as quickly as can be and kept cool until delivered at creamery. Never mix warm and cold milk or cream.

When we remember that the quality of our creamery butter depends so much upon the condition of the milk and cream that is brought to us, we can, to a degree, realize the importance of educating our patrons in the proper care of their milk and cream. For we all know that it is impossible to make a high-grade, finished product with inférior raw material.

As we are confronted with so many difficulties in the creamery, and often have to take cream or milk that is tainted, we cannot adhere to any set rule in the making of butter, but must rely on our own judgment.

Have the same care in the ripening of your cream and the making of your butter, each day, as though you were making the butter to be scored at a convention.

Have a good clean starter and plenty of it, so that if it is necessary to ripen your cream quickly you will not have to ripen it at too high a temperature.

During the first stages in the ripening of the cream it should be stirred frequently to insure uniform ripening. This will also give uniform flavor to the butter.

When the cream has developed the proper amount of acidity if it has not previously been chilled, which it should have been when separated, it should be chilled at this stage to at least 50° and held at this temperature until about three hours before churning, when it should be heated to the churning temperature. And right here I want to say that there are many things that affect the churning temperature, such as breed of cows, period of lactation, feed, etc. Therefore, the butter maker must be always on guard as the churning temperature is of great importance to buttermaking. It may vary from 50 to 65 degrees.

The butter should come after the cream is churned from one-half to one hour. The churn should be stopped when the butter is in well-defined granules, a little larger than wheat. After the buttermilk is drawn, the butter should be washed at once; using plenty of water, enough to float the butter. The churn should be revolved but a few times, but rapidly; this will leave the butter in granular form, the best condition for salting. I prefer to work my butter twice when using a combined churn or when the temperature of the room can be controlled. Directly the butter is packed it should be put in the refrigerator.

In conclusion, I wish to say that the butter maker should keep himself and creamery clean and should get his patrons interested by every possible means. These are the methods I have employed.

Wednesday Evening, January 5, 1910, 8 o'clock.

LADIES' AUXILIARY.

PRESIDENT EDDY: It seems to be a peculiar circumstance that both the president of the Dairymen's Association and the president of the Ladies' Auxiliary are residents of Lamoille county, nevertheless it is true, and I presume if it were necessary Lamoille county would be able and pleased to furnish still more officers of this society. It gives me great pleasure to present to you a lady whom you all very well know as president of the Ladies' Auxiliary and who has worked with the members of the auxiliary and for the success of the society, Mrs. C. F. Smith.

MRS. SMITH: Ladies and Gentlemen, Members of the Vermont Dairymen's Asssociation and Vermont Sugarmaker's Association, Friends:

I am sure I voice the thought of every member of the Women's Auxiliary when I bid you a most happy new year, when I bid you God-speed in all your good words and works for this year of 1910. We are tonight on the threshold of a new cycle of time, and it remains with us to say what the results of our works and words shall be during this year.

I feel sure the first speaker of the evening needs no special introduction to you and so I will simply announce the address by Lieutenant-Governor J. A. Mead of Rutland.

LIEUTENANT-GOVERNOR MEAD: Mrs. President, Members of the Ladies' Auxiliary and Friends:

I wish first to thank Mrs. Smith, the president, for her kind invitation to be present with you this evening, and I feel that I owe you an apology because I am frank to say this is the first time I have been invited to address a ladies' auxiliary of any association, and I am rather chagrined to find the audience composed of of nine-tenths men.

I wish to say a few words about agricultural pursuits. Agricultural life is responsible for the extent of our national growth and of our continuity. There is no other feature of life that compares with agricultural pursuits. We have learned this lesson rather slowly in the United States and in our own State. We have lived in too extravagant a manner, too artificially to accomplish the highest purpose. I think every farmer here present will admit this. We have only to go back and study the conditions of other nations and I think you will join me in the statement that agricultural life is really the foundation of the growth and continuance of every nation, and as they have departed from those fundamental principles they have commenced to go down

and down. Take old Canaan, the promised land,—the land of milk and honey. It was my good fortune to spend a few weeks there a few years ago; before going I read up what history said about that country and I learned that back about two thousand years ago there was a country with its geographical lines very similar to ours supporting from three to five millions of people. When I think of that country as I saw it I wonder what could have caused the difference. Look at Palestine of today,—a disgrace and reflection upon the people who once lived there. I understand there are only about 125,000 people in the whole land today. A little outside the cities you find nothing but wandering tribes,—you might call them robbers, they call them Arabs. Their hills are stripped of the beautiful groves of history where we are told the people used to worship,—and right there is a lesson in forestry for us. Those hills, once beautiful groves and rich with flowers, are now but barren rocks; where 2000 years ago agricultural life was practiced, now a desert shows. It seems that as the agricultural life has declined in a nation, that nation begins to go down. Take Spain, as great and powerful as was that nation, when she neglected her agricultural life she at once began to decline. Even England is declining, and I believe, and am told by those who have studied the subject, it is owing to the fact that her people are neglecting agricultural pursuits.

Let us look at France, a country of small farms and scarcely any millionaires, and yet her wealth equals that of any nation in the whole world. After the Franco-German war how long did it take her to raise a billion of dollars, and today she has more gold in her banks than any other nation. She seemed to recover almost instantaneously from the ravages of that terrible war and took her position as third or fourth among the nations, and today she may be called in many respects the most prosperous nation in Europe. Take Germany, there is another instance where the people have followed agricultural pursuits, and we may say today that she is one of the most aggressive—she and France, the two most progressive nations in the world. England, great and proud as she was until within a few generations, beyond question the most powerful nation,—what has happened? She is going down, there is no question but that she has passed the zenith of her fame, and she is on the decline.

I wish to refer to agricultural life and particularly to the position which it holds as to the possibilities and the growth and continuity of our country. You will ask what are some of the reasons. One is that agricultural products are absolutely essential to life. Any man who has bins filled with corn and wheat and oats, and cattle scattered over his hills, and with fertile fields, has all the essentials of life; he cannot starve; if he desires both comforts and luxuries he can have them because he has everything to buy with.

As to the moral effect of agricultural life. That is a very inter-

esting feature. Take, for example, any agricultural community,—what is the moral tone and education? How does it compare with any place given up to mining pursuits? Do you think there is any comparison? I say there is no life comparable with a life spent in agricultural pursuits, and nowhere can there be greater happiness and contentment found. And to live on a farm in Vermont is a special blessing to any man. I think we have as beautiful a State as there is in all the Union; I think nature has been most prodigal in her dealings with Vermont. Take the marble deposit for instance. Our little Vermont furnishes more marble than all the other States in the Union; we also furnish more granite than the Granite State herself; she is only second to the great State of Pennsylvania in the manufacture of slate, and when you come to dairy products, there is no other State that compares with her when you consider her size. We are producing nearly as much butter as the other New England States combined, so we have something, you see, that we can feel specially proud of. I think by cultivating a love of and for our own State, for her beautiful hills and fertile valleys, her streams, that we should and will have a contented spirit, and nothing so much contributes to our happiness as a contented spirit. We hear a great deal about a new Vermont, that we want better schools, economy in the administration of justice, and all along the lines. My friends, all these good and necessary things will come to us in time if each one will just do his and her part. Let each person take an interest; each person love his State, his county and town better than any other and do those things which will be an honor and a benefit to ourselves, our associates and our State. Then, and not until then, will Vermont be the best place in which to live.

DIETARIES FOR SEVEN AGES OF MAN.

MISS ANNA BARROWS, TEACHERS' COLLEGE, COLUMBIA UNIVERSITY, N. Y.

Sometimes it appears difficult to reconcile practical usage and scientific experiment as to food values, but this is due to an incomplete view of the points on both sides. Many statements about foods are untrue because only one phase is presented.

To decide upon the full value of any food we must consider both its physical and chemical composition, its economic value and its physiological effect in the body.

The elimination of refuse, and the division and subdivision of particles in the process of manufacture are important factors in the nutritive value and digestibility of foods.

The nutritive qualities of many foods are doubtless made more available by a wise use of flavors, which in themselves contain little or no nutriment. Condiments and spices, tea and coffee, and the extractives from meats are of special value for the flavor which they impart to the cheap substantial grain foods, which after all provide the larger part of the food of the human race.

The hours and arrangements for meals have an influence in the assimilation of food. (Expand.) "Indigestion, the Result of Eat-Alone,'' was the topic of an article in a leading medical magazine recently. (See clipping *London Lancet.*) Breakfast in America has been a more substantial meal than it is in Europe, perhaps from climatic conditions.

Through the energy of the cereal manufacturer and the efforts of the "no breakfast" advocate (Dr. Dewey) the American breakfast has been much modified.

The midday dinner seems best adapted to children and invalids, the night dinner is a concession to the competition of business. One dietetic authority estimates more than half of the day's ration of protein and fat and one-third of the carbohydrate is taken at dinner. Therefore the hour of the meal should be such as to provide for a period of rest afterward. "There are some who see in the Sunday dinner of the workman a partial provision for the wants of the whole week." R. Hutchinson, p. 52.

In popular estimation a food is digestible when no feeling of discomfort follows after eating it, or when it is easily and quickly digested. The scientist considers a food digestible in proportion as it is completely digested whether the time be shorter or longer. Persons in health should consume some foods that digest slowly, and beware of depending upon pre-digested foods. If allowed to be idle, the stomach, like any other organ, soon finds it difficult to work.

The seven ages of man described by Shakespeare might illustrate for us the different periods of life calling for changes in diet.

"At first the infant * * * in the nurse's arm.''

The infant thrives and grows on a diet of milk. When the mother cannot supply a sufficient amount, clean milk from a healthy cow by dilution with water or whey and by modification with milk, sugar, and cream may be adapted to the increasing needs of a baby as it develops.

Defective nutrition causes indigestion, intestinal catarrh and many disorders of childhood. Rickets appear to be due to an excess of carbohydrate foods and may be relieved by an increased use of milk and eggs. Dr. Grenfell tells of the primitive mothers in the North who chew the crackers and then feed their babies with the pulpy mass.

Greater cleanliness in collecting and transmitting milk to

consumers is a first requisite for the diet of young children. There is more literature available on food for this period of life than any other.

(Theory and Practise of Infant Feeding,—Henry Dwight Chapin, M.D.)

(Care and Feeding of Children,—L. E. Holt, M.D.)

The school boy requires abundant food from which to construct his rapidly growing body and to provide energy for his active exercise. With him quantity is often more important than quality, while his sister, enjoying less active sports, is over fastidious.

Dainty children and excessively greedy ones both are usually ill fed. Nervous diseases of children, even stammering, will yield to more careful diet. Condiments and stimulating foods must be used in moderation, if at all. Milk, fruit, cereals, whole wheat bread, eggs and vegetables should form the bulk of the diet of school children. Recently the school luncheon has received considerable attention from educators. (Expand.) Pres. G. Stanley Hall says, "For the very young, school lunches have a wonderful effect in overcoming fatigue and clearing up both the mood and the mind."

(School Diet, Clement Dukes, Medical Officer at Rugby, 1899.)

(Plain Words about Food, Rumford Kitchen Leaflets.)

This is the formative period, not only of the body itself, but also of the tastes and habits which will govern it in after life. The food should be such as makes good bones, teeth and muscles. The carbohydrates must not be neglected. The material which Mrs. Richards well says, "Serves as the source of power for the very great activity of youth." Now is the time to teach the child proper methods of mastication.

Dr. Yeo says in Food in Health and Disease. "A chief point is to see that the child does not eat hastily, but masticates his food leisurely." "As to quantity, if a child eats slowly and masticates thoroughly he may generally be trusted to satisfy his appetite at each meal."

The likes and dislikes of children should not be ignored but too often are magnified. The training table helps to overcome whims and notions among boys. Dr. Dukes has said, "Where waste is nil children do not get enough." This may apply to the child's plate as well as to the larder of the boarding school, of which it was written.

With greater attention to food we should see fewer of the type depicted by Shakespeare.

"Then the whining schoolboy, with his satchel
And shining morning face, creeping like a snail
Unwillingly to school."

"And then the lover,
Sighing like a furnace, with a woeful ballad
Made to his mistress' eyebrow."

We may speculate upon the proper diet for a poet "With a Woeful Ballad," and by contrast it might seem to be directly opposite to that prescribed for athletes. One authority dares assert that in the future we may be able to trace the changes that converted a crust of bread or other food through the brains of our noted authors into the conception of their immortal characters.

This is the time to study the effect of social relations upon the attitude of the eater towards his food. The whims and notions of those they admire are often reflected by young persons. The youth, in the state of mind depicted by Shakespeare as belonging to this third age of man, is somewhat oblivious to his surroundings.

The lover and the soldier represent the college days and the strenuous life of early manhood. The training table for athletes in school and college is an admission of the need of a selected diet for special work, an acknowledged influence in physical contests. The definition of an army, given by a famous general—an animal that crawls on its stomach—indicates the importance of proper food for the soldier. No less necessary is it for captains of industry, pioneers and explorers of all kinds.

Probably we have to thank the extreme interest in athletics for indirectly attracting and holding the attention of educators in general to the question of the proper feeding of students. Why should not the food receive more recognition in training for mental supremacy?

The justice in Shakespeare's picture stands as a type of all sedentary occupations and these are the rule rather than the exception after fifty.

For several reasons this stage of life is the hardest to influence by diet. Few are willing to admit that they have reached an age when the manner of living should be modified. Habits have been formed and are not easily changed. Doctors may order a sea voyage, but when the seas are smooth, the menus of the ocean steamers tempt the idle passengers to over indulgence.

This is the age of man in which deaths suddenly follow hearty meals, or if not immediate death, an illness that ends active life. More than one leader in the affairs of state and nation has fallen before his time, a victim of social functions. No wonder that one student of food problems has filed a collection of "deaths from dinners."

The Justice is the type of the prosperous man of sedentary habit who is often overfed, and who should begin modifying his diet after passing the half century mark, but habits are formed and changes must be made gradually. It is generally conceded that three-fourths of the diseases which occur between forty and sixty are due to wrong food and manner of living. In proportion as activity diminishes, the intake of food should decrease.

Some public men of our time, grown wise through watching the mistakes of their predecessors have cut off all dinners and social

functions or merely appear in official capacity to make response to toasts at the end.

The sixth age shifts

"Into the lean and slippered pantaloon,
With spectacles on nose and pouch on side;
His youthful hose, well saved, a world too wide
For his shrunk shank; and his big, manly voice,
Turning again toward childish treble, pipes
And whistles in his sound. Last scene of all,
That ends this strange eventful history,
Is second childishness and mere oblivion,
Sans teeth, sans eyes, sans taste, sans everything."

As You Like It, Act II, Sec. 7.

The last two stages may be considered togethèr since but a small percentage of the human race reaches either of them. It is not a happy picture as portrayed here, but Shakespeare wisely has given us another ending to the "eventful history."

"Though I look old, yet I am strong and lusty;
For in my youth I never did apply
Hot and rebellious liquors in my blood;
Nor did not with unbashful forehead woo
The means of weakness and debility,
Therefore my age is as a lusty winter,
Frosty, but kindly."

Such men and women as Senator Hoar, Dr. Hale, Julia Ward Howe, Mary A. Livermore and President Eliot were not common in Shakespeare's day.

There are two phases of life which may be considered here—the normal old age and the abnormal, which is the real condition of many invalids of fewer actual years. Sometimes early death is due to the "old age" of a single vital organ. Normal old age follows a simple natural life protected from overwork or worry.

What changes should there be in diet for those past sixty? Less food at one time, but at shorter intervals. Less nitrogenous and less concentrated food. The form of food should be adapted to possible lack of teeth. Milk should not be taken at meals, but warm milk, drank slowly, is excellent at bedtime. Eggs and fish and poultry should be substituted largely for meat. Fruits, vegetables prepared simply, and well-cooked cereals may be used freely. Since lack of heat is a common difficulty in age, most foods should be warm. The use of alcoholic beverages is sometimes advisable for the aged person who has not used them in early life, but they should be taken only by direction of a physician. The sense of taste is dulled and higher seasoning may be desirable.

Dr. Hutchinson says, "The danger of overfeeding the old is almost as great as that of underfeeding the young; an excess of nourishment chokes instead of feeding the flickering flame of life. Leanness and longevity, it has been remarked, go together, and a

man will only roll all the faster down the hill of life if his figure is rotund."

Sir Henry Thompson says: "As age increases, the ability to eliminate food unnecessarily consumed notably diminishes. The functions by which surplus and effete matters are thrown off from the system are less active than in youth and middle age; and the results of overfeeding, which a robust constitution can get rid of without obvious evil, becomes a source of dangerous embarrassment to the feebler organization of one advanced in years."

"AS THE TWIG IS BENT THE TREE IS INCLINED."

F. G. FLEETWOOD, MORRISVILLE, VERMONT.

Madam President, Ladies and Gentlemen:

I have always envied the ease with which the Clergy can find a text around which should flow the current of their thought. When the need of public speech is upon them all they must do is to consult the pages of that book of books and from those pages will at once spring the thought which they desire. The topic, which you will see from your program, has been assigned to me and I am to speak for a few moments on that subject. It is very important that there should be a time limit on speakers as well as a time limit on our State constitution. We should also have an open season, during which any audience can shoot on sight the man who exceeds his fifteen minutes,—or twenty minutes. Not desiring to be shot I shall speak much less than twenty minutes.

"As the twig is bent the tree is inclined." We are told that the thoughts of this axiom are centered around the home, and towards the betterment of the home. So to interpret this topic in terms, the twig may stand for the child and his training; later the tree may stand as the child puts forth into the man, his inclinations, his course in life.

Twigs can be dry as bachelors' troubles and easily cast aside,—of no use, dead; they may be green, filled with life-giving sap, budding, blossoming, fruitful,—so is the child.

Now as to the home. We cannot choose by acclamation, we cannot determine or know by any means when the child shall be born. The majority rule does not apply in the case of one's first entrance into life. The decree of the Court cannot limit or define prenatal affection. When the home and the child first meet, there life begins, and to that child it is mighty important whether his first atmosphere be filled with kisses or curses. If, perchance, the words are kindly, affectionate, sympathetic, the chances are that child will be easily governed and will go forth to conquer and

to be loved in the world; if on the contrary he is met with words of reproach and anger, then his nursery soon becomes his prison and he goes out into the world, and probably ere long the doors of our institutions like the prison and reformatory will number him among the inmates; and so in this formative stage the child during his first ten years should meet with kindness and most constant, affectionate control. When the home loses its grasp and the State takes hold through its schools, then a new impress is made upon the mind of the child. The State desires the child to become a citizen and early starts him at his task in life. If you will go back to the early days, the founding of our State,—way back there in 1777 when they framed our first constitution—you recall those early days in July, down at Windsor, where the framers of this constitution for five days labored long and hard and the sixth day they sat down to their morning task, but outside was heard a noise and a clattering of horses' hoofs and through the door burst a messenger from the north giving news of the seriousness of the condition. At the moment a terrifying thunder storm arose, tremendous in its scope, so severe that it kept those men indoors, compelling them to finish their task, and before the night time came every article of that constitution was adopted and became the first life-blood of our young State. There we had bravery and courage and constancy; those are the things which made the early Vermonters what they were; those are the things our girls and boys should have. The first step in culture for every boy and girl to learn is to know the ordinary things of life. If they would succeed they must grasp the meaning of the every day things which come to them. They must also develop concentration, and right here is the great chance for manual and industrial training and the teaching of agriculture in our schools. These are the real things every man and every woman needs, and what he and she need at first, and what he and she will need throughout life.

After the home has done its work, after the school has perfected its teaching, the twig is bent; the tree is now before us,—the man; and he becomes a citizen, no longer held in by the restraining arm of a parent, no longer controlled by the rule of the school. He stands by himself before the world and he must either raise the white flag of surrender or the red flag of triumph. If a man's habits own the man, the man by so much is weakened and right here is where the great importance of Vermont character shows and always has revealed itself, for Vermont was born fighting. A man is a coward if he allows his habits to control him. Here we have time to think hard and we have faith to act, and as men of Vermont we ought always to so act that our deeds may number us among the heroes. If the boy and the girl learn to do the daily task,— do it well,—they are on the road to success.

The last address of the evening was an illustrated one given by Professor H. A. Edson.

Music was furnished by Lessor's Orchestra of Burlington.

Thursday Forenoon, January 6, 1910.

CLEAN MILK AS FOOD.

THE DEMAND FOR IT: REASONABLENESS OF IT.

R. M. WASHBURN, DEPARTMENT OF DAIRY HUSBANDRY, BURLINGTON.

We are gathered here primarily to study into the methods of economical milk production. As a whole our business is that of milk production. It is highly proper therefore that we pause in our considerations of production, to study into the uses to which our product is put, and to study especially the present aspects of the industry. It should certainly not be truthfully said that any class of men know more about an article than the man producing that article, yet I fear there are those who know more about the character and uses of milk and the value of different kinds and qualities of milk, than do the producers of milk. The time for closer study on the part of the dairyman has arrived.

Amount of Milk Used. According to the latest obtainable figures, there are produced in the United States about 7,266,400,000 gallons of milk per year, of which practically 30 percent or 2,180,000,000 gallons are used as milk. Though this figure looks large, it even then amounts to only six-tenths of a pint per day per person, which viewed in that light appears small. If accurate figures could be obtained up to the present time, they would undoubtedly be larger than those named, for milk is being more and more consumed as its real value becomes better known. At present "milk and cream together furnish about 16 percent of the total food of the average American family."

The Demand for Clean Milk is Growing. It is growing quite rapidly. The health authorities, aided by many of the best informed consumers of our cities, are active throughout the land in establishing laws and rules to govern the quality of milk sold in their respective cities. Whereas the milk inspectors formerly had to do principally with the retailer of the milk, the actual producer is now becoming more and more involved, so that the health regulations of Boston and New York and of other large cities are very materially affecting the routine work on the dairy farms throughout New England and New York. That this demand is increasing is apparent to every one at all conversant with the situation. Our first question is, "Is this demand a well founded and an intelligent one?"

Number of Dependent Infants. There are in the United States approximately three-quarters of a million babies under

one year of age at the present time, about one-half million of whom are dependent entirely or largely upon cow's milk for their nourishment, and the percent of bottle fed babies is increasing. Although adults consume considerable quantities of milk, infants and young children furnish the principal market for milk. What relation is there between cow's milk and the well being of these babies? Statistics in this country are wanting on the subject, but we have reason to believe that the figures obtained from Berlin, Germany, are accurate for their conditions, and approximately so for ours. In the following table we note the death rate per thousand of infants fed on different foods:

TABLE I.

GERMAN STATISTICS SHOWING THE DEATH RATE PER THOUSAND FED ON VARIOUS FOODS:

Fed on mother's milk	7.4
Fed on mother's and cow's milk	21.4
Fed on cow's milk	42.1
Fed on milk substitutes	67.7
Fed on cow's milk and substitutes	125.7

From the above we note that where one child dies which is being breast fed, there are nearly six when fed on cow's milk. This in itself would indicate either that cow's milk is not adapted to the human infant, or that there is a great fault somewhere in the handling of the cow's milk. In comparing the composition of human versus cow's milk, we notice that they differ principally in the following points: The fat in cow's milk is about 30 to 40 percent higher than in human; sugar in human is nearly twice as high as that in the cow's; that the protein content of cow's milk is more than twice that of human; that the ash content of cow's is more than three times that of human; that the nutritive ratio in the case of the cow is approximately 1:4 and approximately 1:8 in the human, with an acid reaction in the cow's milk and an alkaline in the human, as indicated in the following table:

TABLE II.

A COMPARISON OF THE TWO MILKS WILL SHOW THEIR AVERAGE RELATIVE COMPONENT PARTS ON A CHEMICAL BASIS.

	H_2O	Fat	Sugar	Pro.	Ash	N. R.	Reaction
Cow's milk	87.0	4.0	4.5	3.75	.75	1:3.9	Acid
Human milk	88.4	3.3	6.9	1.5	.20	1:7.8	Alkaline

The differences as shown on page 65 are quite readily overcome by a method known as modification, which is simply the addition of water, milk, sugar and lime water in such quantities as to establish in the modified cow's milk, approximately the conditions present in the human.

Fat vs. Cleanliness. A study of the methods of modification shows us that it is customary to start a child with a milk in which there is about two percent of fat, and a nutritive ratio of 1:17 or 18, and that gradually the fat content is increased until the child at five or six months of age is receiving milk containing four percent fat, Undoubtedly this fact is largely due to the popular notion that fat is the most valuable ingredient of milk, and that milk has value in proportion to its fat content without any particular reference to the other features. That this is a mistaken belief is becoming known slowly as we study more and more closely the value of the other constituents of the milk and the value of cleanliness. Experiments have been conducted to show the value of rich milk versus half skimmed and skim milk for animal food. These experiments bear out thoroughly the experience of our dairy stock breeders: namely, that rich milk, that is, milk containing around five percent fat, is not conducive to highest bodily vigor; that milk containing practically only half that amount will develop stronger, more robust and thrifty animals whether they be pigs or calves, than will milk containing five percent or more of fat; and we have no reason to doubt but that it is the same with children. In fact we have many reasons for feeling that it is the same with children. Not infrequently in these tests have the pigs and calves on rich milk died outright from acute indigestion, whereas, their mates on a less fat milk have grown vigorously and without internal troubles.

The statement just made is not a "boost" for the Holsteins nor a "slam" on the Jerseys. It is a statement of fact which every housewife and every physician should remember. Moreover, the stand taken in regard to the fat content of milk by many of our city authorities: namely, that whether a cow gives a five percent milk or a three percent milk it must not be changed in any particular, is unwarranted, unjust, and unscientific. If a city or a state adopt a fat standard for milk, it should certainly allow all who wish to standardize their milk to that standard. If that is not to be permitted, then every retailer of milk should be allowed and compelled to set his own standard and be held accountable only to the living up to that self-imposed standard.

Jersey milk standardized to three percent fat is more valuable than the milk of a Holstein which tests only three percent because there will be an equal amount of fat and a greater amount of sugar and protein in such milk, and to forbid such standardization, and to prosecute those who practice it, smacks more of a desire to make a big court record than a desire to safeguard the health or the purse of the consumer.

"A lunch or meal of bread and skim milk is very nutritious in proportion to its cost and convenience, as the following computation shows:

COMPOSITION AND COST OF A LUNCH OR MEAL OF BREAD AND SKIM MILK.

Food Materials.	Amount. Ounces.	Estimated Cost Cents.	Protein Pound.	Fuel Value. Calorie.
Bread	8	3	0.05	604
Skim milk (1 pint) ...	8	2	0.04	255
Total...........		5	0.09	859

The commonly accepted standard for a man at moderately active, muscular work calls for 0.28 pound of protein and a fuel value of 3,500 calories per day, so that the above lunch furnishes very nearly one-third of a day's nutriment and at a cost of but five cents. If whole milk were used instead of skim milk, the cost would be about seven cents and the fuel value 1,080 calories, while the protein would remain the same in amount." *

The above quoted matter thoroughly bears out common experience in the matter of skim milk. So it is to be greatly regretted that the health authorities in any city should find it necessary to acknowledge their inability to enforce a just law, and to cause an unjust law to be enacted in order that they may have something to enforce, for even if the skim milk were sold as whole milk, and even at nine cents per quart, it even then is providing the consumer with digestible dry matter for about 50 cents per pound, which is considerably less than the price paid for other animal foods of similar nutritive ratio.

The ABSENCE OF DIRT is of greater value than the PRESENCE OF FAT over three percent.

CAUSE OF BAD MILK.

The cause of bad milk is something which every producer of milk should understand. That there is a very vital connection between the cleanliness of milk and the health of our children, no one who is informed can deny. For convenience in study, the causes of poor milk may be grouped under three heads:

A. The cow.
B. Air.
C. Bacteria.

*Bul. 363 (Farmer's)—U. S. D. A.

Under the first we must recognize that when the cow is out of condition, her milk is also out of condition; that to a very considerable degree, milk is not dead matter, but portions of the living mother. It is well known to producers of high-class infant-feeding milk that when the cows, for instance, have been injudiciously fed on something like green corn, their bowels become excessively loose, which effect is transmitted through the milk to infants consuming such milk. Any condition in the food which would cause the opposite condition in the foster mother, would cause a similar opposite condition in the child. Again, though a cow may herself be thoroughly healthy, if the food consumed is ill-flavored like rye or wheat pasture, or silage not properly made, the pungent and disagreeable characters will be transmitted to the milk and cause the sensitive child, who soon becomes an expert judge, to refuse the food it so much needs. It is highly unjust and improper, however, to prohibit the feeding of silage to dairy cows altogether, for there is no other food which can be fed in winter which will so closely resemble summer food, and which will keep the cow in such thoroughly good physical condition, to say nothing of the producer's right of say in the matter—that of economical production.

Silage made from mature corn, preserved in properly constructed silos and fed in quantities not greater than 20 to 25 pounds per day, will, by keeping the cow's general system in better condition, cause a better milk to be produced than those same cows could produce under like sanitary conditions were they fed on some dry and constipating food.

The air of the stable is too frequently close and filled with dust and disagreeable odors. That the milk, or the fat of it, will absorb odors, is known to all of us. The rate at which such odors are absorbed, however, has frequently been overestimated. The milk should, however, be removed from the stable atmosphere as soon as it can conveniently be done, and in storage, too, it should be under clean environment. Independent, then, of the possibility of bacterial contamination, there is a reason for an early removal of milk from ill-flavored places.

Bacteria, though tiny things, are now receiving an immense amount of attention, and justly so, for great is their ability to do good or ill. The dairyman, too, must remember that every particle of visible dust carries with it untold thousands of living things which have the power of multiplying and filling large space. The dandruff and hair from the cow carry with them particles of manure which introduce the organisms that are frequently the cause of the "summer complaint," colic, etc. The dust in the air also introduces molds and bacteria from dusty hay and fodder and bedding which injure or destroy the feeding value of such milk.

I say, Brother Dairymen, did you ever see a farmer get up in the morning and, without washing, take two pails of swill from the house to the hog house, handle the tools contained in the hog

house, then go to the horse stable, spank the horses over, feed them their grain, curry them and possibly harness them, then go to the cow stable and after catching and tying up a calf, sit down to milk WITHOUT washing his hands? I say, did you ever see him do all this WITHOUT washing his hands? I have—and we all know that to milk absolutely dry handed is extremely difficult on many cows, and that not infrequently the lower portion of the hand becomes well washed during the milking process. Where does that dirt go? Into solution in the milk, and being in solution it cannot be strained out through any amount of cheese cloth or even absorbent cotton.

Now imagine with me for a moment that the good housewife beat eggs, mixed cake, mixed bread, or did any other similar piece of food work in so dusty and ill-flavored a place as the ordinary cow stable. How many of us would be willing to consume such food? As a matter of fact, however, the detrimental effects which could possibly result from such work, which we would immediately pronounce fearfully dirty, would be nothing of consequence, for the simple reason that all those foods are thoroughly baked and thereby sterilized before being consumed, whereas the milk is consumed raw and that, by our tenderest specimens of humanity. These are not pleasant thoughts, but they are fact thoughts, and this is not a one-sided story.

MILK AS A DISEASE CARRIER.

That epidemics of contagious diseases have been brought about through the medium of milk as a carrier of the specific organisms causing the disease, has been thoroughly well shown many times. In fact, there are on record authentic instances of 500 epidemics which have occurred within the past about 35 years: 317 of typhoid, which is now almost exclusively a country disease, brought about by poor sanitation; 125 scarlet fever; and 58 of diphtheria, all of which were traceable definitely to milk, not as a cause but as a carrier of the organisms introduced carelessly or accidentally, either from close contact with the person having the disease, or from the fact that the dairy utensils have been rinsed in water carrying the disease germ.

WHY HAS CLEANLINESS SUCH VALUE.

Again I repeat that with milk, the absence of dirt is of greater value than the presence of fat over three percent. Why has cleanliness such value? Because milk is a good food for many forms of trouble-making bacteria; because it is consumed in a raw state, which permits of the introduction into the child of any organism which may be in the milk; because it is the principal, if not sole, diet of such infant or child; because of the tender age

of the consumer, all of which emphasize the necessity for great care in the production and handling of this article.

Clean and cold are the two qualities which enabled our distinguished friend and dairyman, Mr. Curler, to ship milk from DeKalb, Illinois, to Paris, France, where, after twenty-one days, it was still sweet and wholesome though carrying no preservative whatever, other than mere cold. The same which enabled a few dairymen who exhibited milk at the 1906 National Dairy Show at Chicago to exhibit a milk of such high quality that "some of the samples remained perfectly sweet after being shipped a thousand miles across the country, put in storage at a temperature of about 32 degrees F. for two weeks, and then reshipped a distance of 900 miles to Washington, D. C., where they were stored in an ordinary ice box for several weeks longer, some of the certified milk samples being still sweet after five weeks. A part of a box of cream entered in this contest was placed in cold storage in Chicago at a temperature of 33 degrees F. and remained sweet and palatable for a period of seven weeks."* When such records can be made by a few men, it opens the eyes of all of us to the possibilities of the industry and should at least make us all thoroughly ashamed of ourselves for producing a milk so dirty and keeping it so carelessly that it becomes sour in one or two days.

In conclusion, then, we must admit that the demand that milk shall at least be as clean as other foods IS a reasonable and just demand.

THE REASONABLENESS OF CLEAN MILK.

To lay aside all sentiment, for love can not be weighed or measured, the naked truth remains that our children are the highest priced stock we have, and that their health and often their lives are continually threatened by the poor quality of milk fed them, and that it is cheaper in dollars and cents to keep them well on clean food than to try to make them well on drug store dope.

The cost of producing such clean milk is considerable, as will immediately be argued. True it does cost more in all cases to produce a clean, wholesome article than to produce one of inferior grade. It requires a greater expenditure for equipment, and a constant and greater expenditure for labor besides a considerably more thorough education in the business, which may cost more dollars to acquire. I maintain, however, that the extra cost of producing clean milk, when added to the present cost of producing plain milk, does not cause the resulting product to be as expensive a food even for the adult as other foods of similar food value, and, too, when our people come to a full understanding of this

*B. A. I. Bul. 87, p. 20.

matter, and will cease demanding a milk rich in fat regardless of how rich it may be in dirt, and will demand cleanliness instead, the extra cost of such cleanly production may be largely compensated by a lessened fat content and thereby work a double benefit, for the milk as food for children will be more valuable because of the absence of both some fat and much dirt.

Adults. Too often milk is thought of as a drink, as a mere beverage, although we know when we stop to think of it that such vegetables as the carrot, parsnip, cabbage and pumpkin, all carry a higher percentage of water than does ordinary milk, or in other words 100 pounds of milk has more dry matter in it then 100 pounds of carrots or parsnips.

To make direct comparison between different foods, however, is difficult, for several factors must be taken into account. To compare feeds directly upon the basis of the amount of protein or muscle making foods that they carry, is equivalent to stating that the heat and energy producing portions are of no value, which is, of course, not true, they being required in 7 to 10 times as great quantity as the former. To make comparisons directly upon the number of units of energy produced is likewise improper, being equivalent to saying that the protein is of no value, which again is untrue; so, then, in order to compare one food against another it is necessary to compare those foods which have similar proportions of protein and energy bearing nutrients, or, in other words, to compare foods of similar nutritive ratio. In the following table the foods are grouped so that those of approximately like nutritive ratios are compared against each other.

TABLE III.

COMPARISON OF FOODS SHOWING WASTE MATTER AND DIGESTIBLE NUTRIENT.*

Name of Food	% Refuse	% Water	% Digestible dry matter	N. R.
Porter House steak	12.7	52.4	38.5	1:2.1
Skim milk	0	90.5	9.2	1.8
Eggs	11.2	65.5	22.2	1.7
Round steak	7.2	60.7	31.4	1.5
Whole milk	0	87.0	12.5	4.3
Smoked ham	10.7	48	38.3	4.2
Cream	0	74	25	18.2
Bacon	7.7	17.4	71.0	15.1

From the above table we are first struck by the high percentage of waste matter in many of our common foods, there being

*Adapted from Farmer's Bul. 142, U. S. D. A.

nearly 13 percent actual waste bone and gristle in Porter House steak and that the bone free portion is composed of more than half water, and that, of the dry matter, another portion is not digestible, giving us only 38.5 percent digestible nutrients in Porter House, with a nutritive ration of 1:2.1. Let us study these foods at their ordinary market prices and see what the actual digestible food nutrients cost per pound, comparing them against others of similar character.

TABLE IV.

Nut. Ratio.	Kind of food.	Ordinary price.	Cost per lb. dig. d. m.
1:2.1	Porter House steak	30c lb.	$00.79
1:1.8	Skim milk	25c qt.	.14
1:1.7	Eggs (1 doz. = 1½ lbs.)	36c doz.	1.03
1:1.5	Round steak	20c lb.	.64
1:4.3	Whole milk	7c qt.	.28
1:4.2	Ham	25c lb.	.65
1:4.3	Certified milk	15c qt.	.60
1:18	Cream	40c qt.	.80
1:15	Bacon	20c lb.	.28

The above table is striking in that it shows us that skim milk with a narrower nutritive ratio than Porter House steak, when sold at 2 1-2 cents a quart, does not cost one-fifth as much per pound of actual food as does Porter House, and that eggs at 36 cents a dozen (1 dozen eggs equalling 1 1-2 pounds) because of the waste of shell and the high water content of the contents of the shell, costs us a little more than $1 per pound of digestible dry matter as against 14 cents in the case of skim milk.

Comparing the second group of whole milk against smoked ham, we find that whole milk at 7 cents a quart costs us only 28 cents per pound digestible dry matter, whereas ham, because of the bone, skim and water, costs us 65 cents per pound, and that certified milk even at the "awful" price of 15 cents a quart costs us only 60 cents a pound, or in other words, CERTIFIED MILK, AT 15 CENTS A QUART, IS A CHEAPER FOOD FOR EVEN THE ADULT THAN SMOKED HAM AT 25 CENTS A POUND.

Coming to the next group and comparing cream against bacon, we find that cream at 40 cents a quart costs us 80 cents per pound digestible dry matter, whereas bacon, with approximately the same food-giving power, at 20 cents a pound, costs us only 28 cents per pound. This illustrates nicely the high esteem in which cream is held, although its food value does not warrant such a price. It has the price attached because of the flavor and because of the name, not because of the food.

"The idea that only whole milk is fit to use, which is rather erroneously held by housewives, is perhaps ascribable to the esteem in which cream is held as an ingredient of 'rich food,' and may lead

to quite needless waste or expenditure. For growing children, who need large quantities of protein and carbohydrates, two quarts of skim milk would supply more of these constituents and more ash than one quart of whole milk. * * * * Many families who are in the habit of drinking whole milk and buying cream, would doubtless be quite as well off if the top of the milk, say two or three inches in a quart bottle, were poured into the cream instead of the milk pitcher; the milk ought still to be far from thin and blue, and there would be a marked saving in the cost of cream."*

If we only had faith enough to believe what we know to be true and would only apply to ourselves and families one-tenth part of the science that is being bestowed on the cow and the pig, our women and our children would be immensely better off. Brother Farmer, did you ever study to balance the ration of your wife? or study the protein needs of your child?

The Duty of the Producer is to study his industry, to recognize the truths as they are made plain, and then to produce as clean a milk as he can for the price he is receiving for it.

The Duty of the Consumer is to take good care of the milk when it reaches his care, that is, to take it in from the sunny porch before it becomes warm, to place it in a cold ice box in which there are no other foods which may give it bad flavors, and lastly it is the duty of the consumer to either quit demanding a better article, or come along with the price to pay for the improvement of the article, for it is just as unfair for the consumer to demand a high class article at a low price as it would be for the consumer to be forced to take a low class article at a high price.

Complaints are quick and numerous the instant the milk is raised one cent even per quart, although even at the new price, veritable bargain counter rates are being received when this food is compared with other foods of similar character. More complaints will usually arise from a rise of one-half cent per pound of milk, than would result from a rise of five cents per pound in the price of meats. There is right and justice in the demand of the consumer for a cleaner, purer milk, and there is equal justice and right in the demand that the consumer pay the extra cost of producing this extra quality.

The Dairyman's Opportunity. The time is ripe for the dairymen of New England and New York, through their State Dairy Associations, to take some part in the formulation of the laws which will affect them so keenly, to take some part in the guiding of this irresistible movement on the part of the consumer; that this movement shall not run over them but shall in part be guided by them sanely; that reasonable time be given for reasonable improvement, and that a due share of the increase of price paid by the consumer shall reach the producer of the article.

*Farmer's Bul. 363, U. S. D. A.

In conclusion, the Dairymen should:

Read the signs of the times,
Recognize the inevitable,
Take a hand in the movement,
Guide it—do not be run over by it,
Clean up,
Produce the stuff the poeple want,
Tell them so,
Make them pay the extra cost.

REPORT OF COMMITTEE ON RESOLUTIONS.

The Committee on Resolutions, through Mr. Wiggin, reported in part as follows:

WHEREAS, the dairy interests in the State of Vermont are of paramount importance, and

WHEREAS, hundreds of buyers of dairy cattle are coming to Vermont annually for the purchase of dairy cattle,—

THEREFORE, BE IT RESOLVED: That a Committee of Publicity of one man from each county, with the Commissioner of Agriculture as Chairman, ex-officio, be appointed by the President of this Association, whose duties shall be to exploit the herds of full blooded and high grade dairy cattle in their respective counties by articles in the various farm and dairy papers of the United States; and by urging upon "The Vermonter" the importance of devoting one issue to the same purpose, and by publishing from time to time such articles as may be furnished by said Committee along said line.

RESOLVED: That the Legislature of Vermont be requested to invest in the Cattle Commissioner, in co-operation with the State Board of Health, the power to employ dairy and creamery inspectors, whose duties shall be to visit all creameries and dairies; producing either cream or milk for sale in their crude state, or manufactured for public sale, to see that they are in a sanitary and healthy condition, and to give such instructions as shall be most conducive to such a conduct of said creameries and dairies.

MR. WIGGIN: In the State of Wisconsin,—as an illustration,—we have this dairyman's organization, state and county organizations and each county confines itself to the breeding in that county some particular type of dairy cattle. Its chief business is to encourage farmers to use thoroughbred sires and of a particular type. These organizations keep an advertisement in nearly all the leading papers, and as a result each county is known to breed a definite type of cattle, and if buyers outside the State desire a special breed it is easy to know just where to go to get what they want.

MR. BROWN: I believe this is a movement along right lines.

There is a large call for dairy cattle and if we can establish a reputation for furnishing the right cattle we can have just as good a market as any place. From Caledonia county there have gone this year between 40 and 50 car loads of graded cattle. I would favor the adoption of this resolution and hope we may work this matter into shape so that it may be of material benefit to the State of Vermont. I second Mr. Wiggin's motion.

MR. JONES: I, too, think the movement is along right lines, and I hope the matter may be worked out without large expense. We don't want to make life any harder for the small farmer than his life already is. There is no use in saying that a farmer must use a thoroughbred bull if he has got to pay a big price for one. Let us arrange some way in which we can help him to the use of a good sire and in that way build up his herd. There are plenty of broad-minded men and men of means in the State of Vermont who are willing and able to help the farmers do that. They are interested to the point that they will give a certain percent of their sire's stock of thoroughbreds if we could arrange in some way that these could be taken care of and developed and put out. I will agree to give three-fourths of all the male thoroughbred Jerseys born on our farm for the next ten years, free of charge, if we can carry the matter on farther and I know there are lots of other breeders who will help out in other lines.

MR. WIGGIN: The resolution regarding the inspection of dairies and creameries and the exploiting committee are two different resolutions. In regard to the exploiting of herds I think we had in mind the same in regard to giving away some full blooded sires, and that there are men in each county who will be glad to do that, and in regard to newspaper advertising and reading notices—I never have written any article along dairy lines that has been refused by newspapers and I think we will have no trouble in getting interesting and instructive dairy matter before the public. In our resolution we say nothing in regard to full blooded sires, but we think that would work itself out. As to what we shall do for our own herds at home,—you understand we are selling the cows we condemn at home to people outside, and our condemned cows that the Babcock test and scales tell us we don't want are from 50 to 75 percent better than the best cows in a good many other States, so we are not doing our neighbors any injury by disposing of such cows to them.

MEMBER: The point I wish to raise is this. The cities of New York and Boston are coming into Vermont for whole milk and the condensaries are growing in number. If we sell our whole milk how are we going to raise our young cattle?

MR. WIGGIN: A man worthy of the name of a native of Vermont should know that the worst thing he can do for his farm and its interests is to sell whole milk. Every farmer should tell a company who offers to buy his whole milk that he cannot and will not sell it in that manner.

MEMBER: I agree with you there. Men who sell whole milk are each year selling their birthright in the form of bi-products, and by and by there will be no principal left on which to draw dividends.

Upon motion duly made and seconded, the resolution in regard to the appointment of a Publicity Committee was adopted.

Following is a list of the members of such a Committee and their residences:

Commissioner of Agriculture, President ex-officio.

Addison,	W. N. Cady
Bennington,	C. C. Jones
Chittenden,	Prof. J. L. Hills
Caledonia, (Lyndonville)	Fred Davis
Essex,	Mr. Fletcher
Franklin,	George Dunsmore
Grand Isle,	T. L. Kinney
Lamoille,	C. F. Smith
Orange,	Arthur Vaughn
Orleans,	M. A. Adams
Rutland,	Frank D. White
Washington,	G. W. Wallace
Windham,	E. A. Andrews
Windsor,	F. Warren Wiggin

PRESIDENT EDDY: What will you do with the second resolution?

MR. WIGGIN: There is nothing that could go into force at present. We are having come into our State, inspectors from Boston and New York telling the farmers what they must do if they sell milk in those cities. Is it right that Vermont should not have systematic inspection of her creameries and dairies? This matter will have to come before our State Legislature before we can get such inspectors and have them paid. I think there will be no trouble in getting an appropriation to cover the pay of two or three such inspectors.

MR. WALLACE: In business in the creamery line, competition has become so sharp that one creamery man cannot refuse to take the product of a farmer because certain conditions exist there. If he does so refuse the product will be taken to another creamery and there accepted. I think the farmers must take hold of this matter themselves. The creameries cannot help the present condition. I say let the State take hold of it and the farmers so that we may have some State laws to help us.

PRESIDENT EDDY: You are putting a great deal on the State Cattle Commissioner. I believe there should be a separate commission for this work, and that it should have full power to act.

MR. WIGGIN: We fear we cannot carry a separate commission at first. We wish to work carefully at first until we get our foundation and then we think there will be no trouble in getting the appointment of a special commission.

The resolution was unanimously adopted.

RESULTS OF THE FIRST YEAR'S WORK OF THE WHITE RIVER DAIRY TEST ASSOCIATION.

C. D. HAZEN, JR.

We have come here years before and heard Professor Hills tell us what we might gain by cow testing associations. We wondered if he knew what he was talking about. We wondered if what he said was true. A little more than a year ago there were three associations formed in Vermont. It is my object today to tell you what one of the associations has done.

Now, just one word of explanation. A cow testing association is a union of farmers who engage a man to spend one day each month at each farm. He comes to the farm in the afternoon, weighs the feed, figures the cost of it and weighs the milk and tests it. From this work for the day, he gets the figures for the month; determines the amount of milk given, the pounds of fat given, the return of each cow; figures the profit or the loss,—the return for one dollar expended,—the cost to produce butter fat and the cost to produce one hundred pounds of milk. In this way, the farmers know just what they are doing.

We organized our Association in November a year ago. Mr. Rabild was with us four days and assisted in the organizing. It was the second association in the State. We had many interesting experiences in organizing. Some of them I will give you. We approached one man and asked him to join our Association. He did not need the work, he said. He knew what his cows produced, he knew what it cost to feed each cow and he knew which his profitable cows were. All this without weighing or testing. Now, I leave it to you,—*did* he know?

Another man had twenty cows, all good producers, he said. Like the other, he did not need the work of the Association. This fall he sold his farm, sold his herd. The purchaser sold five of these cows for $50.00,—$10.00 each. Said they did not have a tooth in their heads; yet the former owner said they were good producers. Now, did *he* know?

Another man has fifty cows. He milks one-third of them himself. He feeds them. He says he feeds exactly for production,—that is, a pound of grain for so many pounds of milk. Says he knows when one cow falls off in production, even though he does not milk her. The feed is not weighed, the milk is not weighed. Now, he says it costs him $1.25 per hundred to make his milk. It is interesting to know that there are but two in our Association where the cost of milk is as high as this. Now, did he know?

Another man told me that there was nothing to it. It was simply a scheme to find employment for a few men. He said, "All you care about it is what you get for carrying this man around." When I protested that I got nothing, he laughed at me, and said that it was made up to me in some way.

When our Association was organized in November, we started with twenty-six herds and five hundred and thirty-eight cows. Things went smoothly for four months. Then we were obliged to change our tester. Four herds fell out at that time. Since then, we have gone through and completed the year and have reorganized for another year. Now, in asking the men who were in the Association what good they got from it, they responded this way.

The man whose herd stands first in the Association has figured his feeds and fed a balanced ration for twelve years. He has tested for production and has known what his cows did for him. He says, "I have gotten great good from it; while I had figured rations before, I had never worked for the economical part. I have fed better and fed a cheaper ration."

Another man gave me these figures. "The first time the tester came, I was feeding a bushel of ensilage and twenty pounds of hay each day. The feed cost me fifteen and one-fourth cents per day for each cow. I cut the ensilage and hay nearly in halves. My feed cost nine and one-fourth cents per day, and in a month, from the same cows, I made thirty pounds more butter." This is as he told me.

Another man had twenty-five cows in the Association. He found that they were not profitable producers. He has sold thirteen of his twenty-five, and the remaining twelve make him more profit above the cost of feed, than did the twenty-five. Did it pay him?

Another man with ten cows decided that seven were not profitable producers. He is keeping his three, and has only good words for the Association.

Another man with thirty cows found that he was keeping them at a loss. He has busied himself with his feeds and is in a fair way to make them profitable producers.

Another man fed a feed very rich in proteid and very low in carbohydrates. His feed was very expensive and he wondered that his cows grew thin. He has balanced his ration,—his cows are in good condition and are producing more at a less cost than they ever have before. Did it pay him?

Another man who sends his milk to the creamery, reports a gain in his creamery test. Mr. Eddy said yesterday that all creamery men were honest. How would he account for this? If you are dissatisfied with your creamery test,—if you think you do not get pay for what you should, why don't you know what you sell? It might pay you well.

Now, I will give you some figures which we found in our hard work. Please remember that these are true; they are facts and not fiction, though they will sound very much like fiction. They are what we have actually done in our Association during the past year. They are facts that we know to be very nearly correct. I have taken these figures from nineteen herds whose records for the year are complete. There were three hundred and ninety cows in these nineteen herds. The average production of milk per cow 4,441 pounds; the average butter fat, 230 pounds; the average return per cow, $72.29; the average cost of feed, $47.37; the average profit, $24.91. Milk cost $1.06, butter fat, 20 1-2 cents.

Compare these figures, please, with the figures for the best herd in the Association. There we find 5,720 pounds of milk; 319 pounds of butter fat; a feed cost of $51.17; a profit per cow of $47.41; milk cost 89 cents; butter fat cost 16 cents.

We found other cases where butter fat and milk were produced as cheaply as in this herd, but the production was much smaller, making the return per cow very much less. Going to the other extreme, we found a herd where the average production of milk was 3,893 pounds; butter fat 203 pounds; the average cost of feed $70.17. The average loss per cow was $6.13. In this case, milk cost $1.80 per hundred and butter fat 34 1-2 cents.

We have heard of men who made their feed for their cows simply the "roughages" grown on their farms and said they were making money. We had one herd of that kind in our Association. We find they average to produce 2,580 pounds of milk; 137 pounds of butter fat; average cost of feed $35.95; the return per cow $7.19.

Another man fed simply cotton seed. When our tester went there first, he found him feeding four pounds to each cow each day. This feed upon his protest was cut in half. This herd produced upon an average, 3,598 pounds of milk; 185 pounds of butter fat; the feed cost $37.85; the return $20.41.

It is interesting to note that the greatest production in butter fat and the greatest profit went together. Also, the second production and the second profit went together, but the greatest loss does not go with the smallest production.

It is interesting, from an educational point, to note that the man whose herd stood first in the Association is a four-year college man and a graduate of our Dairy School. The owner of the second herd is also a graduate of our Dairy School. The manager of the third herd is one who appreciates knowing what he is doing.

Now, for comparison, I have taken the poorest cow in each herd. It is interesting to note that the poorest cow in a number of herds, is better, that is, made more profit than the best cows in some of the herds. I find the average age of these nineteen poor cows to be five years. The average milk production is 3,235 pounds; the fat, 162 pounds. The feed cost $42.72, and they made a profit of $8.43. The poorest cow which we found, that is, the cow making the poorest showing, produced 3,152 pounds of milk; 155 pounds of butter fat. Her feed cost $63.81 and she shows a loss of $15.36. Comparing this cow with the cow which makes the greatest profit, we find this comparison: 8,920 pounds of milk; 495 pounds of butter fat, at a feed cost of $63.60, showing a profit of $90.72. How many cows like the poorest cow would you have to keep to equal this best one? It cost 21 cents more to keep the poorest cow, than to keep the best cow.

Taking the best cow from each herd, we find the average age is six years. The average production 5,674 pounds of milk; 301 pounds of butter fat at a feed cost of $49.15, showing a profit of $44.83.

People, who know, tell me that it is a fair comparison to compare the work of December, 1908, with the work of November, 1909. In these nineteen herds, we find in December '08, 384 cows giving 134,736 pounds of milk; 6,972 pounds of butter fat; their feed cost $2,262.34; butter fat cost on the average, 38 cents per pound. It cost $1.95 per hundred to make milk.

In November, 1909, 374 cows produced 138,694 pounds of milk; 7,223 pounds of butter fat, at a food cost of $1,957.96. In this case, butter fat cost 28 cents per pound and milk $1.46. Comparing these, we find an increase of 3,958 pounds of milk; 251 pounds of butter fat and a decreased cost of feed of $304.38. Figuring this fat at 35 cents, and adding to the cost of feed, we find a gain for November over that of December, the previous year, of $392.23. This is what we have gained in one month by our Testing Association for the year. Now, did that pay? The cost of butter fat was decreased 10 cents per pound; the cost of milk decreased 49 cents per hundred pounds.

How was this change brought about? It was done in the individual herds where their feeds were improved. To show you this, I will give you figures from some of the herds. One herd decreased the cost of fat 4 cents, the cost of milk 30 cents, and saved 70 cents per cow on feed. Another man decreased the cost of butter fat from 44 cents to 25 cents. Another man decreased his fat from 33 cents to 24 cents; another case, from 35 cents to 30 cents.

One thing our Association shows up, it is not wholly production, but what it costs to feed. Now, we have heard stated many times, "You can't keep a cow making less than 200 pounds of butter fat a year." Now, just how poor can a cow be? How low can her production be and she still pay for her feed? We

found a cow producing 114 pounds of butter fat making a loss of 27 cents. If she had made 115 pounds of butter fat, the profit would have been on the right side of the ledger. Did you suppose a cow could produce so little and still pay for her feed?

Now, compare this cow with 114 pounds of butter fat with the cow that produces 155 pounds of butter fat and made a loss of $15.00, and with the cow which produces 185 pounds of butter fat and made a profit of $4.03. It is not production wholly; it is the cost of production, as compared with the cost of feed. You cannot guess at this; you have got to weight and know, and it certainly pays mighty well to know.

To sum up the advantages of cow testing associations, we find we save in feed, both in amount and in cost. We have taken a great deal more interest in our work. We have given our stock better care. They are in better condition today than ever before. We have been cleaner in our methods, because we were ashamed to have some of our methods known. There was one man in our Association whose barn was so dirty at the first visit of our tester, that he hardly wanted to stay in the barn. Today, that barn is ready for your inspection; the owner need not be ashamed of it. Now, I claim that is one of the results. The very poorest of the cows will be sold. We watch our feeds and keep the cost of them down to the production of the cow. We are feeding better rations and we are more interested in what crops we raise.

Most certainly, this Cow Testing Association pays. I hope you will not rest easy until you know what you are doing.

Thursday Afternoon, January 6, 1910.

CARE OF MILK AND CREAM ON THE FARM.

N. P. HULL, DIMONDALE, MICHIGAN.

Mr. President, Ladies and Gentlemen:

I am going to read a little of your Vermont literature to you. I hold in my hand the program of this convention sent to me in Michigan. This is what I read: "Vermont leads the world in its fine production of milk, cream, gilt-edge butter, cheese, and maple sugar." A little further on it says, "The reputation we have won can only be kept by our most energetic efforts."

Since I have been here I have been around among the boys and heard some of them say that much of the cream coming to the creameries here was "rotten";—not all of it, but there were some lots miserably poor. Now if this is a fact, Men, it is up to you to get busy and lead the world in your fine production of dairy products.

Yesterday something was said about this oleo law,—that there was some danger of it being repealed. We shall see to it that this law is not repealed. You need not be so scared about oleo if you see to it that the butter you make is better than the oleo put on the market. There is a lot of butter—actually cow butter—being put on the market in the United States that don't begin to be as good in quality as some of the oleomargarine. How do you expect the consumer is going to pay you a higher price for that poor butter than he is asked to pay for better oleo?

It is up to the dairy farmers, you must make your product better. I know something about creamery buttermaking as well as dairy buttermaking,—and I am going to assure you that there is not a butter maker in this State or any other State who has the cunning that enables him to take poor cream or poor milk, that has gotten bad while in the hands of the dairyman, and make of it a first class article,—one that will bring a first class price for any length of time.

I heard Mr. Schilling, President of the National Dairy Union, say once, that no one need be afraid of overdoing the dairy business; that you might double the cows kept in America today, and if the dairyman made his product good enough he would have no trouble in finding a market and receiving a good price for his product. You can very largely increase the consumption of butter, cheese, milk and cream if you will make your product good enough so that the people will believe it is for their interest

to use it. The price we receive for our products largely depends upon the law of supply and demand, after all.

We want to make our product better. It is for the interest of every one of us to make our product better and if we can get away from this everlasting habit of laying the failure to somebody else and will take some of the blame to ourselves, then we are on the road to recovery. When we don't get quite as much for our product as we think we ought to have, we try to blame the other fellow for it. I grant you the other fellow don't always do what he might, but it is our business to see that our product is number one while it is in our possession, and the example we set may be an incentive to the other fellow to do better.

I am not going to say much about the care of milk. Professor Washburn said all that I could and I say, "Amen," to every word he uttered.

I do wish to say this: That there are three things in regard to the care of milk upon the farm that we must keep ever before us. First—Draw the milk in a cleanly way. Second—Keep it clean. Third—Cool it quickly and keep it cool. If you keep in mind always and practice those three things you will have no difficulty with the care of milk on the farm. Remember that you cannot take those cows that are all covered with filth on the sides and belly and udder and draw the milk in a cleanly way,—that is an impossibility.

As to the care of cream—gathered cream is one of the great questions at the present time—gathered cream creameries are here to stay, because they are along the line of economy. We ought to be interested in producing just as good butter as we used to produce and we can do it with the gathered cream system if the farmers will take ordinarily good care in producing the milk at the farm. Have your cows clean and the person of the milker clean; milk in a clean pail through a clean strainer, and separate the milk in a clean separator. There is no one thing about the dairy business that should be looked after more carefully than the washing and scalding of the separator every time it is used. After the cream is separated it should be cooled at once to 50 degrees and kept where it will not be subject to bad odors.

At the next milking, separate the cream (having a clean separator) and cool that cream to 50 degrees before you mix it with the previously separated cream, and so on after each milking. Never mix warm cream with cold cream. Don't run more than three days cream together. I know some people say they can keep it a week and keep it sweet, but there are germs that develop under a cool temperature and make the cream bitter, and no one can make the best butter out of such cream.

It is for your interest and my interest, Fellow Dairymen, to see to it that we have the best butter possible for that is the only butter that will bring the big prices and give us the best possible return for hard work on the farm.

Commissioner of Agriculture, O. L. Martin, spoke of the New England corn exhibition to be held in Boston, October, 1910, and urged the individual farmer to help make a representative exhibit of Vermont corn at that time.

AGRICULTURAL EXTENSION, A FIRST AID TO THE FARMER.

J. L. HILLS, DIRECTOR, EXPERIMENT STATION, BURLINGTON, VERMONT.

The writer believes in what Shakespeare called, in the free and easy phraseology of his time, "damnable iteration"; that which in the more modern parlance of the advertising agency, is termed "keeping everlastingly at it." If one repeats a statement often enough, not only is he apt to believe in it himself the more strongly, but by its iteration and reiteration he will make an impression upon the public mind in some degree commensurate with what he deems to be its importance. One remarks, "Good morning, have you used——" and one thinks of Pear's soap; "His Master's Voice" raises recollections of the Victor's melodies; and the sight of the picture of the rock of Gibraltar and the thought of life insurance are synchronous. By phrase and picture unceasingly spread before the public eye, the merits of the wares they portray are kept in mind and their sales enhanced.

For some years the writer has thought it better in his annual utterances before this representative body of Vermont farmers to make some distinct impression, if possible, rather than to afford definite instruction; that it were better to indicate what seems to be a desirable forward movement for farm betterment, than to simply discuss some technical subject. In the pursuit of this policy in 1906 he suggested the formation of cow testing associations. A year later his title was "Cow Testing Associations Again." In 1908 the paper was named "Cow Testing Associations Once More," and the dastardly proposition was advanced that some of the funds of this Association be diverted from their regular channel of expenditure and be used in setting some of these organizations at work. There are now five cow test associations at work in Vermont, The writer thinks that this may be in part due to his insistence in the public presentation of the proposition and to the fact that he has led other and better advocates to advocate the scheme.

Now three years ago when talking about cow testing associations he used for the first time in public utterance in this State

the words, "agricultural extension," saying that "The next step forward should be a provision for agricultural extension. This sort of work is done in many States and is almost universally acceptable. I know of no case where it has been abandoned and several where appropriations have been increased because of satisfaction with the work." Again he said in 1908 in addressing this Association: "It is high time that a roving agent, a State agricultural tramp, should be sent about Vermont, up and down its highways, into farmers' houses, into farmers' meetings, talking persuading, demonstrating, organizing; a missionary who shall carry these good tidings of better methods. 'I'm from Missouri, show me,' is the slang phrase. He should show people the right and the wrong of farm methods. These 'agricultural extension' movements are differently organized in different States. In Maine the dairy inspector does the work, a deputy of the Commissioner of Agriculture; in Massachusetts there are several men, of whom the dairy expert is one; in Rhode Island he is a college employee backed by a substantial State appropriation reserved for this specific purpose; in New York factory inspectors and the like; in Quebec and Ontario a multitude of men are at this work in various lines. In Wisconsin factory inspectors, dairy inspectors, dairy agents, and the like are at work all over their State and so one might go on citing the work in other States, some of which appropriate tens of thousands annually for this sort of effort. The National Government is doing some of this same sort of work, particularly in the South, establishing demonstration farms all over that section. There are serious dangers in this sort of pampering, dangers of individual cerebral atrophy, dangers in delegation to governmental authority of the initiative in such movements. However, while recognizing such dangers, one may yet believe that governmental aid may advantageously be invoked in the inception of enterprises which possess such large potentialities; may justify them, in other words, on the ground of public policy."

A year ago, in the discussion of "The Relationship of the Experiment Station to the People," the writer's thesis was essentially this: that the time had come when Vermonters more carefully than hitherto should differentiate between the sundry public agencies for agricultural advancement; when they should understand them better with a view to their improvement, so that with a clearer conception of their several duties and limitations they might intelligently ask, "What next?" and yield to the question an adequate answer. Now the entire trend of today's article will be the development, most imperfectly, of this proposition of agricultural extension, and an attempt to indicate how it may be carried out to advantage in Vermont.

The logical development of this proposition as the writer conceives it is as follows:

First, to define the term.

Second, to point out the aim of the movement.

Third, to indicate the agencies which are involved.

Fourth, to mention the means employed,

Fifth, to show wherein this line of work has proven valuable elsewhere.

Sixth, to indicate what its inception might mean here.

Seventh, to point out what the writer deems to be ways in which the agricultural extension efforts already made in this State can be co-ordinated, regulated, supplemented, and made more effective.

The writer has drawn very freely in his preparation of this address upon the published reports of the Agricultural Extension Committee of the Association of American Agricultural Colleges and Experiment Stations, and upon the publications of the Farmers' Institute Specialist of the Department of Agriculture at Washington. He has also secured from divers parties statements as to this line of work in various States. He freely admits, however, that his summary of this considerable body of data is necessarily imperfect.

I. *Definition.* This is an age of definitions in which stress is laid upon the clear understanding of the meaning of things. Personally, the writer is a stickler for definitions. Hardly a test or examination does he give in college work, but calls in its opening question for a half dozen or more definitions, the next one is very apt to ask the student to discriminate between this and that matter, and yet another question is quite apt to call for the pointing out of errors purposely made in certain statements. A student who can accurately and tersely define, who can indicate unlikenesses, and can detect erroneous statements, is likely to have a pretty clear conception of the general subject. So let us at the outset define our term, that we may the more clearly appreciate what it is we are talking about.

Extension means, according to the dictionary, "the reaching out or stretching out in scope; enlargement; an annex." University extension is the reaching out of University activities beyond academic walls, to non-resident, non-collegiate people; an attempt to bring them, not simply crumbs from the collegiate table, but, as nearly as may be, a full intellectual meal of practical instruction. Agricultural extension is the self-same proposition specialized, an effort not only upon the part of college folks, but of other public educational agencies, such as national and State Departments of Agriculture; to carry to the people the best of agricultural instruction in forms readily comprehended. It is the purveyal of agricultural instruction in tabloid form. It is inculcation by precept and by example, by lecture and by demonstration.

The College and Station Association Committee defines extension teaching in agriculture as embracing "those forms of instruction in subjects, having to do with improved methods of

agricultural production and with the general welfare of the rural population, that are offered to people not enrolled as resident pupils in educational institutions."

II. *Aim.* The aim of this line of work is that of many other agencies of a public nature, the service of mankind. It is not "culture for culture's sake," but "education for service." It attempts to co-ordinate, to regulate and to systematize the various agencies for the improvement of the farm, of the farmer, and of farm life, with a view to making them more efficient. It is particularly an attempt to do this by means of direct contact therewith and by demonstration. Prof. John Hamilton, the farm institute specialist of the United States Department of Agriculture, intimates that most of the information given abroad to farmers is imparted by means of personal teaching, visitation and advice, and not through the medium of the printed page, the bulletin or the book. He states that this is quite unlike the situation obtaining here. He queries whether the relatively slow progress made in agricultural improvement in many sections is not due to the fact that these bulletins, pamphlets and other printed matter, containing often most important information, have not been read or assimilated, and that their teachings have not been put into actual practice by the generality of farmers. It is one of the aims of agricultural extension through personal effort to emphasize and to render comprehensible these printed teachings. I may say without irreverence that while the Bible is a guide to righteous living, its actual effect on human lives is enhanced when interpreted by an inspiring preacher or a devoted missionary. It is the same thing with this proposition that we now have under discussion. The aim of agricultural extension is to inculcate modern methods by means of direct demonstrational work, carried out by an expert, before the eyes of the farmers on their own farms, in their own environments. It is Mahomet going to the mountain, agricultural teaching put on wheels and trundled around among those who need it.

III. *Agencies.* Lest one be misunderstood, let it be repeated that argicultural extension is not solely of the University. The agricultural college ought to be and is vitally interested and bound up in this movement, but is not its sole expositor. The farm institute system, the farmers' organizations, clubs, granges, etc., ought to be equally concerned therein, not to speak of other public service agencies and especially of the country libraries. That such should work in co-operation goes without saying, though it not infrequently happens in the present formative state of the work that the lines of effort of these various agencies are more or less parallel and their respective spheres of interest, to use a diplomatic phrase, not clearly defined. This inevitably means more or less duplication, repetition, waste of effort, misunderstandings, and in some cases even recriminations. This attempt

of public agencies to better farm conditions has had sporadic and uneven growth. Its possibilities were not previsioned at the outset. Like Topsy, it has "just growed," and only of late has it been viewed in the larger way. It now, however, in many States is rapidly becoming co-ordinated and systematized.

IV. *The means employed.* Agricultural extension, as we have seen, is a blanket term covering the attempt to improve agricultural conditions by direct instruction. It does not cover experiment station research work as such, nor the regular four-year instructional efforts in the agricultural college. It does, however, cover many lines of collegiate effort and of the institute system.

Under the former may be listed:

1. Short courses of all sorts.
2. Teachers' summer courses and institutes.
3. Correspondence courses.
4. Informational correspondence.
5. The issuance of educational, informational bulletins.
6. Non-resident, popular lectures on technical subjects before farmers' clubs, granges, women's clubs, at high or normal schools, etc.
7. Demonstrations:
    A. On fair grounds.
    B. On special trains, trolley cars, or other conveyance.
    C. In co-operation with farmers.
8. Advisory oversight of agriculture and nature study teaching in the public schools, including school gardens.

Among the lines of effort more especially the function of the extended institute system may be mentioned:

1. The one or two day institute.
2. The normal or training school for institute speakers.
3. The round-up institute.
4. The movable school of agriculture, that is to say, the special school located a week or two in a place with attendance worked up in advance and guaranteed.
5. The circulation of travelling libraries of agricultural books.
6. The issuance of educational bulletins of information, leaflets on nature study for the schools, of crop reports, etc.
7. The combat with and the prevention of the entrance of dangerous insects and other pests, not including animal diseases.
8. The employment of special agents:
    A. To advise, assist and demonstrate to farmers.
    B. To promote co-operative effort.

Local farmers' organizations can best aid these lines of work by arousing local interest, by furnishing local attendance, and by contributing halls for meetings; fields, orchards, barns, etc., for demonstration.

Now several of the kinds of work listed above have been carried out to a greater or less extent, and more or less well in Vermont. None of them have been adequately done. Every one might have been much more serviceable had such been the will of the people. The college, for instance, has conducted short courses for fifteen years, has taught some few teachers something about agriculture in two summer schools, spends a couple of hundred dollars a year for postage stamps, largely used in advisory correspondence, puts out a few informational bulletins. Its officers do serve in the institute field (three of them address this convention). It has made fair exhibits; has interested itself in secondary school agricultural teaching. It has used for those purposes a portion of the $1800 annually appropriated by the State for the teaching of agriculture, and some of the larger sums appropriated by the national government for investigation and for teaching at Burlington; but it cannot do much that it would like to do in the service of the State without more money and more men.

V. *What has been done elsewhere.* A number of the colleges are instituting special courses for the training of teachers, some in the regular four-year courses, some in the summer school work. The University of Vermont has recently inaugurated work looking towards the training of teachers in agriculture, both in the four-year course and in summer school work. In Iowa, for instance, a number of short courses for training women teachers in agriculture are being held in various sections of the State. Massachusetts has held two successful and largely attended summer schools wherein agriculture has been taught to teachers. Ohio prepares material for teaching elementary courses in agriculture and distributes them in the schools. This is all agricultural extension militant.

Three of the New England colleges are busily at work on this matter of agricultural extension. At the University of Maine correspondence courses have been carried on for some time; regular lecture courses are instituted with granges and farmers' clubs; and in other ways efforts are being made to get closely in touch with the farmer. At the Massachusetts College, co-operative trials are being carried on with farmers; demonstration work is being done at selected centers; there is a large amount of personal advisory work being done, where the extension experts on call go to the farmers, affording direct advice, making plans, indicating how they may be carried out, demonstrating, etc. They are just beginning the running of special trolley cars, carrying lecturing and demonstrating crews. They send agents of divers sorts into the field and the farm houses to carry agricultural instruction to the farmers. All of this costs money; but Massachusetts is rich. Rhode Island, for a long time, has been thus busily engaged. The former president of the Rhode Island College sometime ago mentioned fourteen different sub-divisions

of extension work as carried out at the Rhode Island College of Agriculture and Mechanic Arts:

1. Demonstrations.
2. Co-operative experiments.
3. Extension lectures.
4. Special lectures.
5. A carpet bag campaign.
6. Correspondence courses.
7. Popular bulletins.
8. Travelling libraries.
9. Assistance of the Grange.
10. Nature study.
11. School gardens.
12. Correspondence.
13. General office work.
14. Miscellaneous work.

The work was begun under the immediate supervision of the man who has made agricultural extension a live issue in Maine, and who is now making it a live issue in Massachusetts. The present director of the Rhode Island Experiment Station writes as follows concerning this work:

"It was quite practical in character at the outset, but by degrees it developed more and more into work with school children and the practical demonstrations on the farms were dropped altogether. Furthermore, about four years ago, the annual State appropriation for the support of the College was increased from $15,000 to $25,000, with the understanding that the extension or demonstration work should be paid out of that appropriation. Last year the State Board of Agriculture took up the matter of giving demonstrations in spraying, and conducted many of them throughout the State, in co-operation, in some respects, with the College.

"Feeling the need and importance of a closer touch with the farmers of this State, and of the importance of demonstrating on farms many of the results which the Station has secured, as well as the necessity of studying certain problems on the various soils and under varying climatic conditions in different localities, I sent a circular letter, a year ago, to all of the granges in the State, outlining a scheme for the formation of an experimental union, and requesting volunteers. In response to sixty or more appeals of this kind, one volunteer was secured; later the number was increased to three, then to seven, and during the last few months, the number has grown greatly without any effort on our part, until we now have over 100 active co-operators in the Rhode Island Agricultural Experimental Union.

"In my opinion this is one of the most vital and important lines of work that can be taken up in any State, and it is receiving the most hearty support of our farmers. The work as conducted

this year has been such that it has been very largely supervised by a college officer, and in all such cases strictly experimental features have been incorporated: To illustrate, we are now studying the possibilities of a lot of waste, sandy land in the southern part of the State, and have been most successful this season in the growth there of melons and asparagus. We also have over seventy experiments with alfalfa, testing inoculation with pure cultures and with soils. Also we are comparing the efficiency of pure ground limestone, ground magnesian limestone and slaked lime. Seedings are likewise being made at various seasons, in order to ascertain the best time and best conditions. We believe it is time in this State to either grow alfalfa or determine positively that we cannot; and this work is meeting with much popular favor."

A very large proportion of the agricultural colleges all over the country are doing extension work. Those in the Middle West in particular and in the more wealthy States are spending large sums in this way. Iowa, for instance, has a force of nearly a dozen men, all of them trained experts, whose entire efforts are thus directed. It is a line of work which has thoroughly approved itself everywhere it has been introduced and which has rapidly increased in volume.

VI. *Unification of effort in Vermont for agricultural advancement.* The agricultural extension efforts thus far sporadically made in Vermont, though not thus named, have lacked co-ordination and regulation and have been, on that account, the less effective. We have all been miserable sinners, the writer as well as the rest. But there is this to be pleaded in extenuation, that the system was not well worked out; that workers were few and none too well fitted for their tasks; and that the funds available have been insufficient. The writer, in his discussion of this subject last year before this Association, pointed out that to the Agricultural College was allotted by the State only $1,800 for the teaching of agriculture; that to the Board of Agriculture, now the Commissioner of Agriculture, but $5,000 or less was given, only part of which each year has been spent; to this Association $1,000; to the Horticultural Society, $500; to the Maple Sugar Makers, the same. Moreover, these funds are not appropriated for the distinct purpose of agricultural extension, but for the diverse purposes all allied thereunto, indicated in the several laws.

It is the aggregation rather than the segregation of these sundry efforts which is urged, and,—to use another big word,—their augmentation by further funds; to the end that more modern methods of reaching the farmer be installed, of enthusing him with an interest in and love for his calling, in order that he may be the more likely to be successful therein. This is the aim of agricultural extension, an effort in the interest of good public policy, of which the Cow Testing Association movement is a concrete example.

In their day the stage coach and the tallow candle were effective, but the railroad and the electric light have superseded them. In its day the old-time institute system has done good work; but it may be made more modern to advantage. This discussion is in no sense a criticism of what has been, but a prevision of what ought to be. In its old form it was not capable of adequately serving the needs of Vermont agriculture. A few addresses given two or three times yearly in a county, valuable so far as they go, can hardly convey much definite information. They incite interest, they stimulate discussion, but, save in a few cases, they hardly do more than this; whereas, if instead of several short institutes, several special schools a week long were held at central points, with prearranged attendance, more good would be accomplished. The system which has hitherto been in vogue, of lecturers talking to promiscuous audiences of all ages and both sexes, composed of people, some of limited and others of relatively higher intellectual attainments, is not effective. The ungraded school has been supplanted by the graded school. That which holds for the school, in a less degree, holds for the institute. In several States institutes are now differentiated into men's institutes, women's institutes and boys' institutes. The men talk to the men; the expert in domestic science talks to the women. The two meetings join in the evening for more general topical discussions. The public school sessions are in part given over to speakers who can interest, instruct, or inspire the young along agricultural lines. This last year women's institutes were held in fifteen States; and boys' institutes, planned specifically for the teaching of the rising generation, in five States; movable schools of agriculture in ten States; and three or four day sessions in eleven States. In a number of different States; farmers' short courses and domestic science short courses are held in various sections. This last year, for instance, there are held in Colorado 24 short courses in various sections of the State for farmers, and six for farmers' wives. In several States, educational trains have toured the State, with meetings at stopping points, and with experts manning the trains for demonstration and lecture.

Now the farm institutes, as they have been conducted in Vermont, appear to have been attended by a much smaller proportion of the rural population than is the case in any other State north of the Potomac and east of the Rockies, save two. Only about one person in 28, living upon farms, attends. If he goes twice, he is counted as two individuals. In view of this fact, and since many townspeople attend, it is probably safe to say that as institutes have been conducted of late in Vermont not more than one in fifty of the rural population has been reached annually. This is probably in part due to insufficient advertising of the meetings. It is doubtless due in a majority of cases to the absolute indifference on the part of the farmers to any meetings of this character, be they good or poor. This attitude is met everywhere

and in every State. But it is at least an open question whether this situation is not due, in some degree at any rate, to a feeling on the part of the farmers that the material offered is not worth while. The writer does not intimate that this feeling is warranted but voices his belief that if a more modern, more attractive method of procedure were inaugurated better results might be attained. Compare Vermont's 3.7 percent attendance with that in States where more modern institute systems are in vogue:

New York 14.8, New Jersey 16.3, Pennsylvania 13.5, Maine 5.8, Ohio 37.2, Indiana 20.1, Illinois, 10.0, Michigan 30.6, Wisconsin 10.8 and then there are many others.

With the new and better law we now have, one affording more freedom and more scope, but less money, more effective work may be done. The institute system in this State is in better shape today than ever before. The Commissioner can print bulletins of many kinds; the old Board could not. He can employ agents to go about the State, showing, demonstrating, exhorting; his predecessors could not. Paid an annual salary, he can give more attention to the work than it was possible for the membership of the old Board to do. He is better able to study out the systems in vogue elsewhere, to get in touch with other New England Institute systems than were his predecessors. More will be expected of him than of the old Board, and we believe that he will do more.

The writer might, using the literature at his command and with the special knowledge which his opportunities have enabled him to gain as to this situation, go on at great length in indicating the lines of work which have been carried out in various sections of this country with a view of promoting the education along agricultural lines of adult, non-college-going people. The ways are literally multitudinous. From these many he has sifted out, however, a few of which it seems to him would be entirely practicable and may well be engrafted in our Vermont system. Whether they or any of them are put into vogue will depend entirely upon whether the people want them or not. The expenditure of larger sums cannot be expected in a small and relatively poor State. There are many that are not mentioned which, given the funds and the men, the College would be very glad indeed to supervise and to push; but without means and men, nothing can be done. The University of Vermont, it must be remembered, is a State institution in name rather than in fact; the annual appropriation made by the State for agricultural education at that institution is $1,800, or less than the salary of one professor. With our present force and equipment and funds we expect to do more rather than less, but cannot do much.

The federation of the various agencies, State and private, for agricultural advancement in Vermont is well worth considering. Such federations have been formed in other States and have proven powers for good. If, for example, a representative body

[illegible]

[illegible] ... various New England institute [illegible] ... and modernize the methods: to [illegible]

[illegible] ... save possibly the third one, are [illegible] under the existing enactments of 1908, but the [illegible] for the employment of the special [illegible]

The writer does not deem it impossible to secure an amendment to and extension of the Act of 1908, creating the office of Commissioner of Agriculture, just as was done some years ago

in the State of Maine, and to provide for the necessary extra expenditure. If this were done a great deal of helpful work might be accomplished; the applicability of certain teachings of science to farm practices made visible and tangible; the quality of diverse agricultural products greatly improved.

The writer hopes that what he has said may lead this organization to petition the next General Assembly favoring such an amendment to the statutes.

Professor Hills, in behalf of the Association, presented to F. W. Draper, Enosburg Falls, a loving cup for exhibiting the milk scoring highest, and to F. W. Wiggin, Quechee, a cup for exhibiting cream scoring highest.

The following Delegates were appointed by the President to the American Dairy Farmers' Association meeting.

Professor J. L. Hills,	Burlington.
F. L. Davis,	White River Junction.
O. L. Martin,	Plainfield.
George Aitken,	Woodstock.
J. G. Turnbull,	Barton Landing.
C. C. Jones,	Bennington.
George Dunsmore,	St. Albans.
E. A. Andrews,	Putney.
J. B. Candon,	Pittsford.
F. W. Draper,	Enosburg Falls.

DEBATE.

DEBATE—"*Resolved,* That Dairying Offers Better Opportunities to Farmers of Vermont than Market Gardening and Fruit Growing."

O. L. Martin, T. L. Kinney, C. C. Jones, judges.

R. P. White, time keeper.

Affirmative:	Negative:
C. T. Moran	C. M. Gifford
G. H. Howe	P. Lombard

C. T. MORAN.

1.

Short time it would take to start a dairy farm in Vermont as compared to the long time required to start a market garden and fruit farm.

1. Vermont farms are already dairy farms, only need improving.
2. Would require several years for fruit orchards to grow before any profit could be expected.

3. Vermont farmers are already dairy farmers and have considerable experience in this line and can profit by it, while if they went into market gardening and fruit growing they would have to learn business by costly experience.

2.

Labor Problem.

1. A vital problem for Vermont farmers.

2. Only possible solution is by progressive dairy farming. Can furnish profitable employment the year around.

3. Market gardening and fruit growing gives employment to labor only part of year and labor would go where it could get steady employment.

4. If the market gardener and fruit grower were unable to obtain men needed in planting time, in spring, and fruit harvesting time, in fall, great loss would result.

5. It would be impossible for the farmers of Vermont as a class to obtain from ten to fifty men in the fall when at present it is hard to get one or two.

3.

Future outlook for dairying in Vermont very bright.

1. High prices of dairy products.

2. Institution of Cow Testing Associations.

3. Dairying in Vermont has constantly increased.

Of 33,000 farms in Vermont, 31,000 report dairy products. Increase of 100,000 cows in 40 years.

4. If market gardening and fruit growing offered better opportunities than dairying, why didn't they go into this instead of increasing dairy interests.

5. Large orchards were planted in Vermont before the Civil War. Several counties that were fruit counties are doing nothing now. Others are not planting any new orchards.

4.

Value of dairying in maintaining soil fertility.

1. Market gardens and fruit crops remove large amount of fertility.

2. In dairying nearly all the plant food of crops is returned to the soil with the addition of concentrated or grain foods fed.

3. Look at European farms that are more fertile today than 50 years ago, brought about by dairying.

4. Western farmers were obliged to stop raising continual crops of wheat and go into dairying, although they thought they had an inexhaustible soil.

5. Dairying makes crop rotation possible.

5.

What has been done in other States and in other countries can be done in Vermont.

1. Denmark, with a poor soil and a climate inferior to that of Vermont, doubled her yield per cow and saved the country from bankruptcy.

2. August Kink, of Sweden, increased the average of his herd of 70 cows in six years from 7,000 to 11,000 pounds of milk per year.

3. Numerous other instances in the United States.

C. M. GIFFORD.

Mr. President, Honorable Board of Decision, Members of the Dairymen's Association:

The negative accepts the statement of the question at issue, as made by the first speaker, but I would call your attention to our definition of terms.

By market gardening we mean the raising of all kinds of vegetables for market, including asparagus, green peas, sweet corn, melons, tomatoes, potatoes, squashes, etc.

Fruit growing includes the raising of strawberries, all kinds of bush fruits, grapes, cherries, plums, and especially apples.

My first point is:

Vermont is admirably adapted to growing fruits and vegetables.

Professor F. A. Waugh, formerly horticulturist at this Station, in an article on "Horticulture in Vermont," says:

"With the exception of apricots, peaches and sweet cherries, all the fruits and vegetables of the temperate zone can be grown here to perfection. The only reason which can account for the non-development of Vermont's horticultural resources is the fact that the possibilities are not appreciated by her land-owners. Vermont farmers are extremely conservative, and slow to make a change in their methods of farming, so that the signal success of the few who have taken up fruit growing, makes but small impression on the many who are still busy making butter and raising hay, potatoes, and little patches of grain."

In Bul. 141 of this Station, Professor Stuart says:

"Vermont soils and climate are for the most part admirably adapted to apple culture. They develop a thrifty, long-lived tree, and a high quality, long-keeping, and well-colored fruit. The cold winters tend to repress insect pests and fungous diseases, which are less in evidence here than elsewhere in this country. These superior advantages ought to induce extensive commercial orcharding."

Second. There is good local market for small fruits and vegetables.

Mr. L. H. Sheldon, of Fair Haven, Vt., in a paper on "The Growing and Marketing of Vegetables," says: "We know absolutely that if you will raise good stuff, put it on the market in an attractive form, establish a reputation for a square deal and then let people know what you have, that you can sell a lot of goods right here in Vermont.

A. The cities and larger manufacturing towns of the State furnish excellent markets.

B. The increasing influx of summer visitors, who are tired of the canned and wilted stuff of the large cities.

C. The canning industry, which supplies those same people for the other nine months of the year, is on the increase, and will furnish a profitable outlet for a large amount of such produce.

D. Scarcity of such goods in our local markets.

If people could get good, first-class plums, cherries, raspberries, etc., they would begin to demand them. As it is now, in many places the consumer hardly knows what a first-class article is. The dealer cannot get such goods without sending outside the State for them, and you know the difference between a home-grown fruit and one picked half ripe and shipped from the grower to the commission man, and then to the retailer.

My third main point is:

A well managed truck or fruit farm offers better financial returns than are possible on a dairy farm.

An average of nine replies to a circular letter sent out to good, progressive, dairymen, among them your President and many members of your Association, in different parts of the State, showed a profit of 6.93 percent, computed from their own estimates, as to cost of keeping one cow one year, and annual value of total products of one cow. This, remember, does not take into account taxes, interest, insurance, or depreciation in value of working equipment. Repairs to buildings, losses in the herd due to sickness and old age, and the wear and tear on team and tools would probably lower the figure a least to four percent actual profit on investment.

My colleague will speak of the profits possible from a well-managed orchard. His lowest figure of profits now being made by progressive orchardists in this State is 10 percent, while in this case depreciation would be very much less, as the orchard is all the time increasing in value.

My fourth and last point is Market Gardening and Fruit-growing offer better opportunities for social enjoyment, and self-improvement.

Profits first year.

Pests which survive our winters may be controlled by spraying and other easily applicable methods.

How about contagious abortion, milk fever, foot-and-mouth disease, tuberculosis?

Labor problem the most serious one confronting the dairymen.

It is hard to get good help who are willing to milk. When help is kept the year round, it is so much harder for the women of the house. A farmer does not need an army to take care of an orchard of 10-15 acres, which my colleague has shown will yield a net income of $2500 to $3000.

Soil fertility conservation.

In my replies, from nine dairy farms, one cow is kept to eight acres.

Our yield of hay in Vermont probably one and one-half tons per acre. In how high a state of fertility are our fields?

High prices. Grain and labor also high. Cow test associations reach less than one percent of cows in this State. Vermont has always been a dairy State.

What can be done in other States can be done here. Hood River Valley, Ore., orchard land $2,500 per acre, crop shipped 3,000 miles sold in New York City at $3-$5 per bushel box.

Dairying a sure thing, sure to give a lot of hard work for the returns which it gives.

Dairy products always in demand, middle man the one who gets the most profit from their production. Comparative cost of hauling raw material. Don't ship vegetables. Cow uses food otherwise wasted. Bran and cottonseed pretty expensive "wastes."

Development of natural pests.

Development of means of combating them.

G. H. HOWE.

Mr. President, Members of the State Dairymen's Association, and Honorable Board of Decision:

I maintain the second part of the affirmative of this debate for the following reasons:

1. Vermont is adapted to the dairy industry because of topography, soil and climatic conditions.
2. The dependence which can be placed upon dairying as compared with horticultural pursuits.
3. Dairy products are always in demand.
4. The dairy cow utilizes foods which would otherwise be wasted.
5. The development of natural pests when business is concentrated to a single enterprise.

1. Vermont is adapted to the dairy industry because of topography, soil and climatic conditions.

The very name "Green Mountain State" naturally signifies to us all a rich and fertile region well adapted to the dairy industry. Vermont is a rugged country, a country made up principally of hills and mountains upon whose sides lie the well-known rich and stony pastures. One man has said that they grow sturdy crops of men and cattle among the stones. Because of our fine soil

conditions the effects of the climate can be changed for the cow. The statement has been made that in order to make a dairy State out of Missouri, you must change the people, the soil and the climate, all of these can and are already being accomplished in Vermont. We can educate the people; manure the soil; and build warm barns for our cows. (With horticulture the climate must be accepted at it is.)

2. The dependence which can be placed upon dairying as compared with horticultural pursuits.

Every man who expects to be successful in business must be engaged in a line of work upon which he can depend. And it goes without saying that a man who has a good herd of cows and gives them their proper care has a paying proposition.

Horticultural enterprises are not stable in this State. Statistics show that the apple crop averages to fail one year out of two.

The Rural New Yorker of the 10th of last July says, concerning New York and Vermont fruit regions, that the unfavorable blooming weather following the exhausted drought of last year has raised havoc with fruit trees in general. Peaches are dropping badly. Pears are scarcely available and apples are not in evidence. Various diseases are injuring the trees. From the Vermont notes of the N. E. Homestead appeared the following item last summer: "The fruit outlook is very poor; pears next to nothing; apples scarce and severely injured by the louse. There will be principally cider stock and little first class fruit. The drought caught the strawberries and burned the raspberries."

3. Dairy products are always in demand.

Dairymen always find a ready market for their produce and the prices received are not all eaten up by expensive hauling and shipping. In the busy season the dairyman may set his can of milk or cream in a wagon and his wife or daughter will drive it to town where is it removed, allowing her to go on about her shopping while the man and team are at home working. Dairymen's goods can readily be shipped to our Eastern Atlantic coast cities. Butter brings at the present time 35-40 cents per pound, cheese 15–20 cents, whole milk 7–9 cents per quart, cream 40–50 cents.

I find the following item in one of the last issues of "Practical Dairyman." "The prices of dairy products were never higher at this season of the year. The rise in price is a material one. It is not artificial nor has it been created save by the law of supply and demand. The public has been educated to demand a better milk and have gotten it better year by year for the last decade."

Vermont fruit and vegetable growers cannot ship their produce to Boston or New York because of competition. Many men are already engaged in the business within easy reach of the market where their goods can be rushed whenever the prices are right.

Cow's milk is one of the fundamental necessities of our present civilization. At the present time two-thirds of the babies in the

United States are being raised on cow's milk and this percentage is steadily increasing. The milk-producing industry has elements of stability that many other industries lack. It has the constancy and regularity of all business that rests upon fundamental and daily demand.

For its price milk gives more food value than any other article of diet placed upon a family's table.

Milk contains all the necessary food constituents. It is palatable, digestible, nutritious and cheap. There will be a constantly increasing demand for milk in the large cities as well as a growing need of dairy products, and the dairy farmer has a sure thing.

4. The dairy cow utilizes foods which would otherwise be wasted.

What would become of all our hay, grass, corn stover and straw were it not for the dairy cow? These materials are non-digestible for the human, yet they make the best of stock food. If all the grass and corn stover and straw were left upon the land what a fine bunch of kindling we would leave for forest and prairie fires. You might then, if you please, call the cow a fire-warden. Hillsides must be kept in sod not for sentiment but for cows.

One acre of land will produce corn stover enough to furnish digestible nutrients sufficient to produce 350 pounds of milk solids. What would you do with all your pumpkins and squashes which do not get ripe, or those which cannot be sold profitably, without the dairy cow?

5. The development of natural pests when business is concentrated to a single enterprise.

Just as soon as the people of a region undertake a single plant industry, along come all the boys and insects which were ever known to infest these crops. This has happened in the West, in the South, and in foreign countries and the people have been obliged to diversify their methods of farming and incidentally take up dairying.

The chinch bug has forced the farmers of the Northwest to give up wheat and turn to cows. The Hessian fly has forced the farmers of Kansas and Nebraska to do the same.

The Bole-weevil is now forcing the farmers of the South out of the cotton industry to diversified farming.

The chief of the Dairy Division in Washington says that common sense and cow manure are the two essentials elements for successful farming.

The largest pests of the New England region are the San Jose scales and Brown-tail moths. Think of the thousands of dollars Massachusetts, New York and New Hampshire have already spent fighting these pests, and even now Vermont is inoculated with them. If this State should be changed to carry on Horticultural pursuits entirely, it would take all the taxes we could raise to fight the pests and even then I think we would have to call upon the

militia. Thus it seems proven that dairying has been, and is going to be, the permanent industry of this State.

Therefore, I maintain the second part of the affirmative for the following resolves:

1. That Vermont is adapted to the dairy industry because of topography, soil and climatic conditions.
2. Because of the dependence which can be placed upon dairying as compared with horticultural pursuits.
3. Because dairy products are always in demand.
4. Because the dairy cow utilizes foods which would otherwise be wasted.
5. Because of the development of natural pests when business is concentrated to a single enterprise.

P. M. LOMBARD.

Mr. Chairman, Honorable Judges, Worthy Opponents, Ladies and Gentlemen:

You have heard the question. My colleague has proven to you conclusively some of the disadvantages of dairying in Vermont, and that there is a good local market for small fruits and vegetables. I will now endeavor to prove to you that Vermont is especially adapted to fruit growing and offers better opportunities to the farmers of Vermont than dairying.

I will give some of the natural conditions favoring fruit growing.

From the horticultural standpoint the climate is a valuable asset. We hear a great deal about the lovely climate of California, but you can produce no fruit or vegetable there to its full perfection.

Also trees do not live in the Western States more than 20 years, while we have trees in Vermont over 200 years old and still bearing fine fruit.

J. H. Hale, of Connecticut, says, "Any variety of fruit or vegetable that we can grow New England at all, we can grow better than they can grow anywhere else in America."

Professor John Craig of Cornell, a man who probably has the most extensive observation in orchard survey of any man in this part of the country, in the *Tribune Farmer* of December 2, says in part as follows: "Climate and soil are two most important factors affecting the appearance and quality of an apple. The apples of the Northern latitude are always characterized by crisp acid, or subacid, juicy flesh and high color."

We have natural drainage, natural wind breaks and usually natural rainfall.

Now, Gentlemen, with nearly everything to our advantage to grow the product, how can we put our high quality goods before the consumer? This is very easy, we are within a night's ride by express, or 25 hours by fast freight, of the finest market

in the world. There is a great deal of interest in Vermont now in fruit growing.

What better proof do we want of the lack of interest in dairying than the many requests regarding the planting and care of orchards that are being received at the Vermont Experiment Station?

Take the Dairy meeting last year, with only $40 offered in prizes, 50 samples of cream and market milk were received in time for complete analysis; this year with two $25 cups and $26 in money offered, only 16 samples were received and only 10 in time for complete analysis.

Take the short Dairy Course at Morrill Hall, it is four weeks shorter this year, still we have a smaller number of men.

I wonder not at the lack of interest in dairying in Vermont. The life of the dairyman is a good deal like his dogs'; the idea of being tied down to a bunch of cows 365 days in the year appeals to few.

The Dairymen are up against a serious proposition; you sell your milk, Gentlemen, do you realize what you are doing? You are shipping your farm out of the State by the cars. Every farmer knows that milk contains nitrogen, the costliest of our plant foods. My opponents may say, "I'll make my milk into butter.'' Very well, your grain comes from the West, you ship it two or three hundred miles or one thousand miles and drag it over these Vermont hills, and your butter has to compete with the foreign market. The Westerner buys land very cheap, raises his own grain and can put a car load of butter, finished product, on the market and ship it no further than you do your grain.

The following data I secured by letter from prominent orchardists of Vermont.

A 10 acre orchard, 16 years set, has sold $4,000 worth of fruit, net, in the past three years; meantime crops of corn have been raised on this same orchard to more than pay for all the expense of tilling, fertilizing and spraying.

Another orchard of four acres containing 117 trees yielded $1,200, net, each year for 13 years; this last year was an off year and it produced 210 barrels at $5.50; 98 at $2.00 or $1,351.

Calling this orchard worth $1,000 per acre, it yields a net annual income of 30 percent on investment. Good orchard land can be bought on Isle LaMotte for $50 per acre, which if put into orchard and carefully tilled for ten years; would be cheap at $500 per acre.

To quote the words of George W. Perry, President of Vermont Horticultural Society: "Our best orchard men in the Champlain Valley reckon that young apple trees set out will,—in proper soil and location, and properly cared for,—increase in value $1.00 a year each, so if you purchase 25 acres at $50 an acre and set it out 50 trees to the acre, at the end of twenty years the

orchard would be worth $25,000 more than paid for the land.'' Meantime good crops of squashes, potatoes, beans, etc., can be raised for the first ten years; the second ten years the trees will bear paying crops of apples; when the orchard has been set twenty years, it is good for an average income of $2,500, or 10 percent on $25,000 for 50 years to come.

People outside of Vermont realize the opportunities for fruit growing if we do not. Professor Cummings received a letter from a canning factory in Illinois inquiring what kinds of fruits were raised, and when ripe, saying they preferred Vermont fruits to any others.

He has also received letters from men in New York, Michigan and Colorado asking for the prices of orchard land in Vermont.

Mr. Jones, speaking for the Judges, gave the debators words of encouragement and compliment for their efforts in setting forth their arguments in favor of and against the question, stating the Judges had decided in favor of the Affirmative, "That Dairying Offers Better Opportunities to Farmers of Vermont Than Market Gardening and Fruit Growing.''

REPORT OF COMMITTEE ON RESOLUTIONS.

The Vermont Dairymen's Association at its 40th annual convention, in conjunction with the Vermont Maple Sugar Makers' Association, hereby extends thanks to the speakers who have contributed to the success of our meetings; to the citizens of Burlington who have given us such a hearty welcome; and to the Press which has aided so materially by giving publicity to the educational benefits of our meetings.

We feel that we have suffered a great loss in the death of Ex.-Governor Charles J. Bell, and of the Hon. George W. Pierce, who were long, active and earnest members of both organizations.

We affirm our belief that the future advancement of our common schools should include the teaching of agriculture and other industrial arts.

We believe conditions require that Congress take measures toward the institution of the Parcels Post, so-called, and that United States Senators be elected by popular vote.

We believe that the present oleomargarine law is necessary for the best interests of Vermont dairymen, and would earnestly request that our delegation in Congress use all honorable means to prevent its repeal.

Respectfully submitted,

GEORGE H. DUNSMORE,
G. W. WALLACE,
F. W. WIGGINS,
For the Vermont Dairymen's Association.

H. W. VAIL,
For the Vermont Maple Sugar Makers' Association.

Report adopted.

A BRIEF HISTORY OF VERMONT DAIRYMEN'S ASSOCIATION.

H. W. VAIL, RANDOLPH, VERMONT.

The Vermont Dairymen's Association was one of the first organized in America. It appears from our report that an association had recently been formed in New York State, probably at Syracuse, the great center of the cheese interest and Gardner B. Weeks was its secretary. It was reported also that Wisconsin organized her Dairymen's association a little prior to that of Vermont. In 1870, these organizations appear to have been the only associations of the kind in America. At Montpelier, October 19, 1869, during the session of the Legislature of that year, a call appeared for the Vermont Dairymen and other citizens to meet in the rooms of the Committee of Agriculture on October 27th, three p. m., for the purpose of organizing the Vermont Dairymen's Association. This call was signed by fifty prominent citizens of the State, headed by Homer E. Royce, Charles W. Willard and others. At this meeting, pursuant to the call, R. J. Saxe was made temporary chairman and O. S. Bliss, of Georgia, secretary. A committee was appointed to draft a constitution and by-laws and the meeting was adjourned to October 28th, when the committee reported constitution and by-laws, which were adopted, a membership roll was formed and officers for the year were elected as follows:

E. D. Mason, of Richmond,	President.
O. S. Bliss, of Georgia,	Secretary.

There was a membership formed this fall of one hundred members and the first winter meeting was held at St. Albans, January 20th and 21st, 1870. Here, then, was ushered into life and activity an Association of Vermont Dairymen, whose object was concisely set forth in Article 2 of the Constitution as follows:

Article 2. "The object of the Vermont Dairymen's Association shall be to promote the dairy interests of the State and all subsidiary interests."

After forty years of existence, it seemed wise in our secretary to give a review of its work and to give to the State, whose wards we have for some years been, a brief account of our stewardship.

Let us take a brief review of the dairy conditions prevailing forty years ago. The old native cow reigned supreme. There were very few herds of pure bred cattle of any breed and practically few grades of the milking breeds to be found in the State. Nobody had proclaimed the value of early cut hay, or of the superior value

of clover. The only grain fed cows was corn-meal, with sometimes oat mixture. No cotton-seed meal, gluten meal, or oil meal, and bran was, in some of the larger flour-mills, run into the stream, as wholly a refuse as is saw-dust at lumber mills today. There was no general knowledge of a balanced ration for domestic animals. At the first meetings of the Association, if any scientist had ventured to occupy the time with talks on microbes, germs, protein or carbohydrates, he might have heard, in the language of the street, the expression, "Bug house."

Butter was made from setting milk in small ten quart pans. There were no creameries and I have been unable to find notice of cheese factories in the State at that period. Private dairying was the rule. No deep setting of milk or large pans, no separators and no applied power for the manufacture of dairy goods; no veterinary surgeons to advise in animal diseases and there was very little general knowledge of the cause of disease, its nature, symptoms, or its remedies. We had some cow doctors, they were like poets—born, not made,—and the hornail was the deadly bovine malady, and the agricultural experiment stations were unknown. After forty years, we may look back upon the wonderful development of the dairy industry, its implements and methods, with much interest. It cannot be claimed that the Dairymen's Association invented implements, or discovered processes, or has made scientific research in solving the great dairy problems, but it has ever been the great clearing house for advanced dairy ideas. Every inventor has been given room at our meetings; every experimentor has been given a hearing; every professor that has plowed deep into dairy science has been led to the rostrum and the cream of dairy knowledge has gone out in its reports to the dairymen, located in all parts of the State. Four hundred or five hundred of the best dairymen of the State annually attend the meetings of the Association and the doubter and the questioner has always been in evidence, and no gold bricks pass inspection. Its work has been to gather the latest and best, and place it in the hands of the dairymen of the State. It has been interesting to me to go over the reports and mark the advent of the new as it appeared and found voice in the annual conventions. At the first meeting which was held at St. Albans, in the winter of 1870, the following program was given and I introduce it in full, to show the talent employed and the progressive spirit of the Association.

Hon. X. A. Willard, Dairy Manager of the *Rural New Yorker*, a paper on the factory or associated management of making dairy products.

Dr. Middleton Goldsmith of Rutland, a paper on the methods of investigation necessary to the full development of the dairy interests of Vermont.

A discussion of the management of farm dairies, also deodorizing and cooling milk in making cheese, the salting and packing of butter.

Should the cream be soured or churned sweet?

Hon. Homer E. Royce, a paper on marketing dairy produce.

Hon. Henry Lane of Cornwall, a paper on the cultivation of sugar beets for stock feeding.

Hon. George B. Loring of Massachusetts, a paper on breeding and feeding of stock.

Gov. Thomas G. Alvoid of Syracuse, New York, was also one of the speakers.

It will be seen by the above program that the speakers were the best authority at that time upon the several subjects treated.

The reports also show that the thirty-nine meetings of the Association, held since that date, give evidence of equally wise selection of speakers and topics, covering the broad field of the dairy and its subsidiary interests and I will note some of the advanced steps as they appear in the reports of the Dairymen's Association.

ASSOCIATED DAIRYING.

In the winter meeting of 1870, a paper was read on the factory system of dairying by X. A. Willard of New York. It was stated that the first cheese factory of America was made in 1850 in the State of New York, by Jesse Williams, who combined with a few of his neighbors to make up their cheese at a common point to save work in their families. This was accomplished without any idea that he had hit upon a great principle that was to lift a burden from the arms of toil the world over. He also stated that there were at that date about a thousand cheese factories in the State of New York. In 1873, a speaker made the reference to creameries or so-called "Butter Factories." They appear to have increased very rapidly and were followed later by milk condensing plants and a steady increase, which continues today, in the shipment of cream and milk to supply the large cities.

THE DAIRY COW.

BREEDING AND FEEDING.

There were but few thoroughbred herds of the dairy breeds in the State in 1870. The Association immediately took up the important question of how to improve our dairy cows and the advocates of the various dairy breeds were given a hearing in nearly all of the meetings of the Association. At the first meeting in 1870, a paper was read upon the stock breeding and feeding, and the merits of the various breeds were canvassed, and this is the way in which the now popular butter-producing cow was treated. After giving a good description of her general appearance, he said the Jersey cow was a good cow to ornament the grounds of the wealthy estates; that her milk was rich in buttreacious

particles. (This word "Buttreacious" probably antedates the word "Butter-fat.") Some of these cows have been reported to have made fourteen pounds of butter in a week; that a few of them were sufficient to give the desired color to a whole dairy of other breeds of cows; that her milk alone was too rich for butter or cheese. Today, there is hardly a dairy in the State that does not show a strong infusion of the blood of some dairy breed and the value of a good cow is well appreciated.

DAIRY FEEDS.

In 1870, there was no winter dairying; cows were usually milked about seven of the summer months and, as a rule, were allowed to go dry during the winter. The winter feed of late cut hay and corn meal apparently did not give good results at the pail. In the winter meetings of 1871, at Burlington, we had the first paper upon soiling dairy cows and corn fodder was advised to be fed green. This topic created a discussion and its value was questioned. At this meeting also, we find the first notice of early cut hay, or "dried grass," as it was called. At the meeting of 1872, E. S. Wood of Pomfret read a paper, entitled, "Does it Pay to Feed Grain to Milch Cows?" in which he advocated its use. Mr. Ellsworth of Barre, Massachusetts, advocated feeding cows only twice a day, a system which has since been widely adopted. In 1872, I find the first discussion on the use of cotton-seed meal and it came into use slowly. Many dairymen injured cows from feeding this grain in too large quantities. Gluten meal came into feed a little later and the first notice I find of silos was in 1879. A report was read, written by Dr. Bailey of Billerica, Massachusetts, giving his experience in the use of ensilage. This silo is said to be the first built in America. Two years later, in 1881, Captain Morton of Essex, read a paper, giving his one year's experience with the first Vermont silo.

The feeding of wheat bran came in slowly and was used by dairymen doubtfully for some years.

It must be remembered that the experiment stations have accomplished a great work in very recent years, in giving the knowledge of the value of different feeds. The experiment station had its prophets in these early days. President Angell of the University of Vermont, before the Dairymen's Association in 1871, said that he regretted that there was no provision in this country for scientific research in the field of determining the best foods and the best methods of handling the dairy cow and her products, milk, butter and cheese. A year earlier than this, Dr. Goldsmith of Rutland had given a vision of the experiment station in his paper upon the methods of investigation necessary to the full development of the Vermont dairy interests.

DISEASES OF THE DAIRY CATTLE.

As previously mentioned, in 1869, we had no educated veterinaries in the State. At the first winter meeting, a paper was read by Secretary O. S. Bliss, written by Prof. John Gamgee, an eminent veterinary of London, England, upon the diseases of American dairy cattle. He treated of pluro-pneumonia, of Texas fever and foot and mouth disease and the paper was conspicuous in the absence at that date of any reference to bovine tuberculosis. In 1876, Dr. Noah Cressy, of the Massachusetts Agricultural College, gave lectures in various parts of the State, as well as at the Dairymen's Association, upon the diseases of domestic animals. In 1892, Dr. Peters, a Massachusetts veterinary, gave a paper upon bovine tuberculosis, at the winter meeting of the Association, held at Brattleboro, In 1894, Dr. Rich of Burlington, during a meeting of the Association held at Burlington, tested and condemned a portion of the experiment herd and slaughter and examination was made in the presence of a large number of the dairymen assembled.

At the present date, well educated veterinaries are within the reach of dairymen in all parts of the State.

THE MANNER OF SECURING CREAM.

The transition from the small pans to the large, surrounded by cold water, was discussed at some of the early meetings and was followed later by deep setting in cans, sometimes called the "Cooley System," and the separator was presented in a discussion early in the eighties and as late as 1894 it was urged by some good dairymen that the best grade of butter could not be made by the separator process, but the separator captured butter prizes and won its way into universal use.

FINANCEERING THE ASSOCIATION.

The Association started without visible means of support. The early members paid the membership fee of two dollars, annual, or five dollars for life, and money was secured in small sums from advertisers in our reports, also from the salt and dairy implement exhibitors at our meetings. The Legislature gave permit for reports to be printed as public documents, with the Board of Agriculture. The Vermont State Agricultural Society, in 1872, advanced $150 from their funds, for printing Association reports and, in 1888, the State Legislature voted an appropriation of $1000 a year for the use of the Association, and the Ladies' Auxiliary was a feature of the Association in 1892 and has become

an important factor in the winter meetings. The first banquet of the Association was held at St. Johnsbury, and has become an annual feature of the Convention and its meetings are said to be, in election years, the first grand marshalling of the political host for an active political campaign; however that may be, it is a fact that the politicians have the best opportunity possible of meeting at the Dairymen's Association the progressive, up-to-date Vermont farmers. A list of the executive officers, past and present, of the Association, may be of interest to the readers of this historical sketch.

PRESIDENTS:

E. D. Mason, elected 1869; F. D. Duglas, Whiting; O. M. Tinkham, Pomfret; Henry M. Arms, Springfield, 1891; J. O. Sanford, Stamford, 1895; C. S. Smith, Morrisville, 1897; Geo. W. Pierce, Brattleboro, 1899; M. A. Adams, Derby, 1900; Geo. Aikens, Woodstock, 1902; H. C. Bruce, Sharon, 1904; Dana H. Morse, Randolph, 1906; C. F. Eddy, Stowe, 1908.

SECRETARIES:

O. S. Bliss, Georgia, 1869; O. M. Tinkham, 1882; E. L. Bass; James K. Curtis; Geo. W. Pierce; and F. L. Davis.

The election of officers resulted as follows:

President	F. L. Davis, Hartford
First Vice-President	W. O. Blood, Norwich
Second Vice-President	W. E. Carter, Rutland
Secretary	F. H. Bickford, Bradford
Treasurer	M. A. Adams, Derby
Auditor	C. F. Smith, Morrisville

Adjournment.

THE BANQUET.

The annual banquet was served at the Van Ness House Thursday evening at eight o'clock. Nearly four hundred covers were laid; Lessor's orchestra furnished music during the evening.

At the close of the banquet President Eddy introduced the Toastmaster, Congressman D. J. Foster, of Burlington, who, in responding, congratulated the members of the society upon the successful meeting just closed and repeated what he said he had before told them, that if there was one industry above and beyond all others worthy the admiration and respectful attention of the people of the United States, it was the industry of agriculture, and that the Dairymen's Society represented one branch of that industry; that the head of that industry was the chief executive of the United States, President Taft, and in his absence the proper procedure was for the assembly to join in singing America. This was done, a male quartet leading. Mr. Foster paid Vermont's Governor several compliments, the cause for which, as he said, arose during the recent eventful 1,200 mile trip they both took down the Mississippi in company with President Taft and representatives from the other States. He introduced Governor Prouty, who responded to the toast "Vermont."

Governor Prouty said in part: "You have noticed in the papers today that we have before us at the present time some very important problems; problems that mean much to us; problems that we must study that we may solve them in the best possible way. The commission which was appointed to make recommendations for changes in our constitution have reported, and at this time I call it to your attention that you may give it the thought which it deserves; the report has been made after very careful consideration; a great deal of thought has been put into it; the question has been studied in all its aspects and the result is the eight recommendations which are presented. This matter will come before you at the next session of the Legislature and before that time you should have them in mind and be thinking of them so that when the time comes for action you will be in condition to act properly.

"Another problem before us relates to the administration of justice. I believe the system we have now is a good one and that we shall make a mistake if we change the system materially, but I do believe there are things that are very wrong in the administration of justice in our law courts. I believe that the system of the municipal courts today is not a proper one; that those courts are not operated as they ought to be; that there should be some provision by which we should not be obliged to pay two men for doing one man's work. Such things as that, and other similar

matters are wrong, and we must give them our attention and try to right the wrong.

"But, after all, the great problem which we have before us in this State today, the problem which will make more difference to us than anything else, is the question as to what we shall do with the younger generation that is growing up today; the question of what shall be their education; the question as to how you and I shall keep our boys and girls interested in their homes; the question of how we shall keep the young man of Vermont in Vermont, because he ought to stay here; there is just as good a chance for him here as there is anywhere else. If you will exert the same amount of energy and force upon the soil in Vermont as you would in some other State you will succeed here. Are you farmers doing a wise thing in buying all your grain from the West? Could you not by proper and thorough cultivation raise all you require here? You may talk about conservation of our forests, and conservation of other things, but the conservation of the soil that you cultivate is the one thing to conserve. Educate your children to love agricultural pursuits and to understand that farming is just as much a profession and an honorable one, as is the profession of law or other so-called professions."

After the quartet sang two selections the Toastmaster introduced Hon. F. N. Newell, the Director of the Reclamation Service, of Washington, who gave an interesting and instructive address (illustrated by colored slides) treating of the work done in his department throughout the West.

Mr. M. J. Hapgood, the Sage of Peru, was introduced and presented the following resolution, which was unanimously adopted.

Resolved that we learn, with feelings of the most sincere regret, the absence of any marker over the grave of the author of the "Green Mountain Boys," whose writings and whose name are among the proudest possessions of our State. And we pledge ourselves at this gathering connected with the first meeting of any State organization since the discovery was made public, to use our best influence and endeavor to properly retrieve the situation.

WOMAN'S AUXILIARY.

The sixteenth annual meeting of the Association of Dairymen's Wives and Daughters was held in the parlors of the Van Ness House, January 6, 1910.

The meeting was called to order by the President and opened by a whistling solo by Miss Anna Bliss accompanied by her mother, Mrs. C. C. Bliss. The President, Mrs. Mary A. Smith of Morrisville, made a few remarks and spoke of the sorrow that had recently entered the home of Governor Bell, Hon. George Pierce of Brattleboro, and illness in the home of Mrs. Edna Beach our former Secretary. The Secretary's report of last meeting was read, accepted and adopted.

The President then introduced Miss Barrows of Columbia University, who gave a very interesting and instructive demonstrated lecture on domestic sience. Miss Payne was then introduced and outlined the work in Home Economics at the University.

During the meeting each member was provided with envelopes in which yearly subscription and address were placed.

The officers of the past year were re-elected and are as follows:

President,	Mrs. Mary A. Smith,	Morrisville
Vice-President,	Mrs. M. L. Aseltine,	North Fairfax
Sec. and Treas.,	Anna J. Stacy	Charlotte

Mrs. C. C. Jones was appointed by the President to succeed Mrs. Draper as member of the nominating committee. A rising vote of thanks was extended to Miss Anna Barrows, Miss Bliss, Mrs. Bliss and the management of the Van Ness House.

Adjourned to meet at the same time and place as the Vermont Dairymen's Association. ANNA J. STACY, Secretary.

CONSTITUTION.

ARTICLE I. This society shall be known as the "Association of Dairymen's Wives and Daughters,'' auxiliary to the Vermont Dairymen's Association.

ARTICLE II. The object of said association shall be the promotion of acquaintance and good fellowship among the wives and daughters of Vermont farmers; also the improvement of its members in intellectual pursuits and all topics of general interest.

ARTICLE III. The officers of this association shall be a president, vice-president, secretary and treasurer.

ARTICLE IV. This society or association shall hold its meetings annually in conjunction with the meetings of the Vermont Dairymen's Association. Seven members shall constitute a quorum.

ARTICLE V. Any lady may become a member by the payment of $.25. This sum to be paid annually whenever the member is present at the meeting.

BY-LAWS.

ARTICLE I. Duties of officers. The president shall preside at all meetings and conduct them by a formal order of business; shall deliver an annual address, and shall perform the other duties usually belonging to this office. In case of her absence these duties shall be performed by the vice-president. The vice-president shall hold herself ready to assist the president in any way.

ARTICLE II. The secretary shall keep a correct record of all meetings. Shall keep a list of members with their addresses and shall give a written report of the transactions of the society at each annual meeting.

ARTICLE III. The treasurer shall receive, hold and pay out all moneys of the society subject to its order, and shall render a written report at the annual meeting.

ARTICLE IV. It shall be the duty of the program or literary committee to prepare a suitable program for each yearly meeting.

ARTICLE V. This constitution and by-laws may be amended at any regular meeting of the society, by a two-thirds vote of same, provided a notice of the intended change has been given, not less than one month previous.

LIST OF MEMBERS OF WOMAN'S AUXILIARY.

Mrs. Margaret M. Reed	Burlington
Mrs. Mary H. Pitkin	Marshfield
Mrs. Carrie A. Nelson Shackford	Ryegate
Mrs. Annie Dodge	Morrisville
Mrs. Mary A. Smith	Morrisville
Mrs. D. D. Howe	Burlington
Mrs. Mary R. Ralph	Brookfield
Mrs. A. L. Walker	South Woodstock
Mrs. Elinor T. Clark	Brookfield
Mrs. E. P. Carpenter	Waterford
Mrs. S. J. Hastings	Passumpsic
Mrs. F. S. Collins	Burlington
Mrs. George Crane	Wilmington
Mrs. C. J. Bell	Hardwick
Mrs. L. R. Jones	Burlington
Mrs. C. M. Winslow	Brandon
Mrs. J. O. Sanford	Stamford
Mrs. Mary Kibbe	Brookfield
Mrs. Louis W. Clark	Brookfield
Mrs. A. B. Manchester	Randolph
Mrs. T. F. Betterly	West Brattleboro
Mrs. C. H. James	Cornwall
Mrs. Sarah J. R. Whitman	Brattleboro

Mrs. C. D. Hazen	Wilder
Mrs. Jennie Bronson	East Hardwick
Mrs. Ida M. Pierce	Brattleboro
Mrs. Jennie L. Brock	Barnet
Mrs. F. L. Smith	Fletcher
Mrs. M. W. Clark	Williston
Mrs. John Smith	Newbury
Mrs. Jennie S. Bentley	St. Albans
Mrs. M. A. Curtis	Georgia
Mrs. M. B. Fuller	Georgia
Mrs. C. E. Martin	Rochester
Mrs. E. W. Smith	East Berkshire
Mrs. E. R. Towne	Waterbury
Mrs. R. B. Galusha	South Royalton
Mrs. H. M. Crane	St. Albans
Mrs. O. T. Sunderland	Georgia
Mrs. M. L. Aseltine	North Fairfax
Miss Elma Eldred	Sheldon
Mrs. E. M. Denney	Montpelier
Mrs. Fanny M. Drew	St. Johnsbury
Mrs. C. H. Higgins	St. Johnsbury
Mrs. Alma F. Waters	St. Johnsbury
Mrs. Mary A. Brackett	St. Johnsbury
Mrs. Bessie H. Strong	North Pomfret
Mrs. S. A. Vail	Randolph
Mrs. I C. Houghton	Lyndon
Mrs. L. F. Bickford	Bradford
Mrs. L. H. Davis	Barre
Mrs. J. E. Bass	Randolph
Mrs. Edward C. Smith	St. Albans
Mrs. Jennie S. Wood	Winchester, N. H.
Mrs. Sophia B. Craddock	Brattleboro
Mrs. Ella A. Eames	Brattleboro
Mrs. Almira L. C. Robbins	Brattleboro
Mrs. Susan F. Lowe	Brattleboro
Mrs. H. D. Thayer	Brattleboro
Mrs. M. I. Reed	Vernon
Mrs. W. C. Cushing	Vernon
Mrs. A. A. Mason	Townshend
Mrs. E. B. Batchelder	Townshend
Mrs. Callie S. Talcott	Williston
Mrs. T. H. Lyster	St. Johnsbury
Mrs. M. B. Leach	Essex
Mrs. C. F. Eddy	Stowe
Mrs. F. S. Heath	Johnson
Mrs. J. F. McLam	Topsham
Mrs. H. M. Fay	No. Williston
Miss Marion Dean Patterson	St. Johnsbury
Mrs. H. W. Rice	Essex Junction

Mrs. Elsworth Cisson....................Providence, R. I.
Mrs. Frank Brigham..............................Bradford
Miss Anna Stacy............................East Charlotte
Mrs. W. S. Hastings.........................St. Johnsbury
Mrs. J. A. Leary...................................Jericho
Mrs. P. B. B. Northrup..........................Sheldon
Mrs. W. H. Whitcomb.............................Jericho
Mrs. Isadora A. Candon.........................Pittsford
Mrs. Mary H. McCormick.........................Rutland
Mrs. Etta W. LePage.................................Barre
Mrs. Winnifred Sprague....................East Brookfield
Mrs. Ida H. Reed..................................Shelburne
Mrs. G. E. Davidson...............................Newfane
Mrs. A. Elizabeth Sherburne......................Wilder
Mrs. F. M. Bigelow..................................Essex
Mrs. Elizabeth B. Lund........................Burlington
Mrs. Sarah J. Rice...............................Burlington
Mrs. Edna S. Beach..............................Charlotte
Miss A. M. Bell..............................East Hardwick
Mrs. Della J. Gile..............................Morristown
Mrs. Annette M. Sherwin.......................Hyde Park
Mrs. T. E. Donahue..............................Hinesburg
Mrs. D. G. Donahue........................East Charlotte
Mrs. Lottie A. Terrill...........................Morrisville
Mrs. Sarah D. Coburn......................East Montpelier
Mrs. Phœbe C. Adams...............................Stowe
Mrs. S. C. Pike.................................Marshfield
Mrs. J. A. Nesser.........................South Burlington
Mrs. Alice W. Colby..........................West Berlin
Mrs. J. A. Kelton..........................East Montpelier
Mrs. George Cochran..............................Ryegate
Mrs. E. C. Hillis..........................North Montpelier
Miss Mabel F. Coburn......................East Montpelier
Mrs. J. A. Coburn..........................East Montpelier
Mrs. H. H. Templeton......................East Montpelier
Mrs. Rogene E. Herrick.......................West Milton
Mrs. L. A. Gilman........................Randolph Center
Mrs. F. W. Ayers....................................Essex
Mrs. C. W. Guernsey............................Montpelier
Mrs. F. T. Hutchinson...........................Worcester
Mrs. A. C. Hall.................................Putnamville
Mrs. J. C. Peck..................................Morrisville
Mrs. Oliver Drew..........................South Burlington
Mrs. Alice M. Carpenter........................Cambridge
Mrs. F. L. Russell..............................Shrewsbury
Mrs. C. J. Pameter..............................Montpelier
Mrs. H. Brown..............................East Montpelier
Mrs. Lenora H. Mimms.................41 High St., St. Albans
Mrs. C. C. Gates.................................N. Hartland

Mrs. Cyrus A. Bump............................W. Salisbury
Mrs. W. S. Haynes........................Middletown Springs
Mrs. A. J. Haynes...............12 E. Washington St., Rutland
Miss Nellie Barney....................12 Liberty Ave., Rutland
Mrs. L. R. Burr..............................N. Clarendon
Mrs. Edward Nichols...............................Bridport
Mrs. D. K. Hall....................................Rutland
Mrs. W. O. Baird.................................Pittsford
Mrs. H. L. Winslow...........................N. Clarendon
Mrs. R. S. Wetmore...............................Pittsford

Members for 1904.

Mrs. W. S. Robie...................................Franklin
Mrs. Inez Scribner...............................Bennington
Mrs. F. B. Dutton................................Woodstock

Members for 1905.

Mrs. F. W. Draper..........................Enosburg Falls
Mrs. R. S. Burnett...................................Bethel
Mrs. Anna Bellows...................................Panton
Mrs. C. L. Parmenter...................9 Vine St., Montpelier
Mrs. Cora Bates...............................East Barre
Mrs. W. C. Nye................................East Barre
Mrs. C. M. Howe.......................................Barre
Mrs. H. C. Bruce............................Milford, Mass.
Mrs. Geo. B. Walton..............................Montpelier
Mrs. W. E. Ducharme...................................Barre

Members for 1906.

Mrs. Adda F. Howie..........................Elm Grove, Wis.
Mrs. Emma Fox Candon.............................Pittsford
Mrs. Jennie Macomber.............................Shelburne
Mrs. A. D. Cochrane................................Jericho

Members for 1907.

Mrs. C. M. Byington..............................Charlotte
Mrs. V. A. Irish.............................Enosburg Falls
Mrs. C. M. King.....................................Benson
Mrs. C. W. Howard.................................Shoreham
Mrs. L. H. Sheldon...............................Fair Haven
Mrs. L. K. Osgood..................................Rutland
Mrs. C. O. Harvey................................Shelburne

Mrs. H. W. Sargent . . . . Brattleboro
Mrs. H. M. Farnham . . . . East Montpelier
Mrs. Gertrude Whitcher . . . . Groton, R. F. D., No. 3
Mrs. Beach Beers . . . . Charlotte

Members for 1908.

Mrs. Laura Crampton . . . .
Mrs. H. B. Farmer . . . .
Mrs. Lucinda Faucher . . . .
Mrs. Alice E. Stannard . . . .
Mrs. W. H. Chamberlin . . . .
Mrs. P. O. Eddy . . . .

Members for 1909.

Mrs. C. F. Eddy . . . . Stowe
Mrs. F. S. Heath . . . . Johnson
Mrs. J. F. McLam . . . . Topsham
Mrs. H. M. Fay . . . . No. Williston
Miss Marion Dean Patterson . . . . St. Johnsbury
Mrs. H. W. Rice . . . . Essex Junction
Mrs. Elsworth Cisson . . . . Providence, R. I.
Mrs. Frank Brigham . . . . Bradford
Miss Anna Stacy . . . . East Charlotte

LIST OF CREAMERIES AND CHEESE FACTORIES IN VERMONT.

1910.

Addison County.

Bridport	Edward Nichols Creamery
Bridport	Edward Nichols Cheese Factory
Bristol	Crystal Springs Creamery
Ferrisburg	Ferrisburg Co-op. Creamery
Lincoln	Lincoln Co-op. Creamery
Middlebury	Middlebury Co-op. Creamery
Middlebury	Farmingdale Cheese Factory
Monkton	Donahue's Creamery
New Haven	Beaver Glen Creamery
New Haven	Beaver Glen Cheese Factory
New Haven Mills	New Haven Mills Creamery
North Ferrisburg	Lewis Creek Creamery
Orwell	Orwell Cheese Factory Co.
Panton	Panton Co-op. Creamery
Panton	Elgin Springs Creamery Co.
Salisbury	Lake Dunsmore Creamery
Shoreham	Shoreham Cheese Mfg. Co
Shoreham	Red Clover Cheese Mfg. Co.
Shoreham	Batchelder & Snyder Creamery
Shoreham	Creamery
Starksboro	Starksboro Creamery Co.
So. Starsboro	Green Mt. Cold Spring Co-op. Creamery
Weybridge	Reef Bridge Creamery
Vergennes	Vergennes Creamery

Bennington County.

Arlington	West Arlington Cheese Factory
Dorset	Dorset Cheese Association
Langrove	Mountain Lake Creamery Station
Manchester	Battenkill Cheese Factory
No. Rupert	No. Rupert Cheese Factory
Peru	Peru Cheese Company
Pownal	Pownal Valley Creamery
Rupert	Cloverdale Cheese Factory
Readsboro	Elgin Creamery
South Shaftsbury	Everest Bros. Creamery
Winhall	Green Mountain Cheese Association
Winhall	Mountain Lake Creamery Station

Caledonia County.

Burke........................H. D. Webster Creamery
Barnet........................Barnet Creamery Association
Burke........................Burke Creamery Co.
Danville........................Danville Creamery
East Barnet........................East Barnet Creamery Company
East Peacham........................East Peacham Creamery Co.
East Hardwick........................Lamoille Valley Creamery
East Hardwick........................Montgomery's Creamery
Groton........................Groton Creamery Co.
Groton........................Blue Mt. Creamery Co.
Lyndonville........................Lyndonville Creamery Association
North Danville........................North Danville Co-op. Creamery
Passumpsic........................Passumpsic Creamery Co.
St. Johnsbury........................Harry Scott's Creamery
So. Walden........................Lyndonville Creamery Ass'n
So. Peacham........................So. Peacham Creamery Co.
Sheffield........................Sheffield Co-op. Creamery Ass'n
So. Ryegate........................So. Ryegate Creamery Co.
Walden........................Noyesville Creamery
West Barnet........................Mountain View Creamery
St. Johnsbury........................H. P. Hood & Sons

Chittenden County.

Westford........................Cloverdale Creamery Station
Westford Hollow........................Donahue's Creamery Station
Williston........................Williston Co-op. Creamery
Williston........................Winooski Creamery Co.
West Milton........................West Milton Co-op. Cream
Colchester........................Colchester Co-op. Creamery
Charlotte........................Lake View Creamery
Charlotte........................A. R. White's Creamery
Essex Junction........................Wm. B. Johnson's Creamery
Essex Junction........................Donahue Bros. Creamery
Essex Center........................Browns River Creamery
Hinesburg........................Chittenden County Creamery Co.
Hinesburg........................Valley Falls Creamery Co.
Hinesburg........................McDonough Cheese Factory
Huntington........................J. W. Johnson's Creamery
Huntington Center........................G. M. Norton & Co. Creamery
Jericho........................Lyndonville Creamery Co.
Jericho........................Standard Creamery Co.
Milton........................Donahue's Creamery
Milton........................Standard Creamery
Richmond........................Borden's Condensed Milk

Richmond....................Jonesville Creamery Association
Shelburne.......................Shelburne Co-op. Creamery
Underhill ....Underhill Creamery
Underhill ....Underhill Co-op. Creamery

Franklin County.

Bakersfield.............................Sunset Creamery
West Berkshire................Vt. Clover Creamery Co.
East Berkshire.........................Marcey's Creamery
East Berkshire......................B. Comb's Creamery
Enosburg Falls...................Enosburg Falls Creamery
Enosburg Falls..................Owls Head Creamery Co.
Fairfax..................................Fairfax Creamery
Fletcher..........................Clover Leaf Creamery
Georgia..........................Standard Creamery Co.
Highgate...........................Highgate Creamery
Montgomery.......................Crystal Falls Creamery
Oakland..................................Gem Creamery
St. Albans.....................Franklin County Creamery
Sheldon................................Capitol Creamery
Sheldon Junction.........................H. P. Hood & Co.
Swanton.................................Swanton Creamery
Greens Corner...................J. G. Turnbull Co. Creamery
Fairfield.................................H. P. Hood & Co.

Essex County.

Concord........................Trout Brook Creamery Co.
Gallups.............................Gallups Creamery Co.
Luenburg.......................Lunenburg Co-op. Creamery

Grand Isle County.

Albany...........................Albany Co-op. Creamery
Grand Isle......................Sampson Co-op. Creamery
Grand Isle....................Grand Isle Co-op. Creamery
North Hero......................North Hero Creamery Co.
South Hero....................South Hero Creamery Ass'n

Lamoille County.

Elmore.........................Lake Elmore Creamery Co.
Cambridge..............................H. P. Hood & Sons
Johnson.......................Lyndonville Creamery Ass'n
Morrisville.........................Jackson Creamery Co.
Stowe...............................Mt. Mansfield Creamery
Wolcott ....Riverside Creamery
Cambridge Junction....................Jackson's Creamery

Orange County.

Braintree	Snowville Creamery
Bradford	Lyndonville Creamery Ass'n
Brookfield	C. Brigham Co. Station
Chelsea	Orange County Creamery Ass'n
Corinth	Lyndonville Creamery Ass'n.
East Thetford	H. P. Hood & Sons
East Corinth	East Corinth Creamery Co.
Fairlee	H. P. Hood & Sons
North Randolph	North Randolph Co-op. Creamery
North Thetford	North Thetford Creamery
Randolph	Randolph Co-op. Creamery
Randolph	C. Brigham Co.
Randolph Center	Geo. H. Temple Creamery
Strafford	Strafford Creamery Co.
Topsham	Co-operative Creamery Co.
Tunbridge	Tunbridge Creamery Co.
Washington	Washington Creamery Ass'n
Wells River	Wells River Creamery Ass'n
West Topsham	Green Mt. Creamery Co.
Williamstown	Lyndonville Creamery Co.
E. Corinth	Farmer's Creamery Co-op.
Vershire	Lyndonville Creamery Ass'n.
W. Fairlee	Lyndonville Creamery Ass'n.

Orleans County.

Albany	J. G. Turnbull Creamery Co.
Barton	Crystal Lake Creamery
Barton Landing	J. G. Turnbull Co. Creamery
Craftsbury	Black River Creamery
Coventry	J. G. Turnbull Co. Creamery
Charlestown	Clyde River Creamery
Derby	J. G. Turnbull Co. Creamery
Evansville	Evansville Creamey
Glover	Lyndonville Creamery Ass'n
Greensboro	Caspian Lake Creamery
Holland	Holland Creamery Co.
Irasburg	Jersey Star Creamery
Lowell	J. G. Turnbull Co. Creamery
Newport	Eureka Creamery Co.
Newport Center	J. G. Turnbull Co. Creamery
North Craftsbury	Mill Village Creamery Co.
South Troy	J. G. Turnbull Co. Creamery
Troy	Eureka Creamery Co.
West Charlestown	J. G. Turnbull Co. Creamery
West Glover	Meadow Brook Creamery

Rutland County.

Benson....................................Benson Creamery
Benson..............................Maplehurst Creamery
Chittenden......................East Pittsford Cheese Factory
Clarendon.........................C. Brigham Co. Station
Danby.............................C. Brigham Co. Station
Danby Four Corners................C. Brigham Co. Station
East Poultney.................East Poultney Cheese Factory
East Wallingford...................C. Brigham Co. Station
Hubbardton.....................Gilt Edge Cheese Factory
Hubbardton..............................Capitol Creamery
Healdville..................A. W. Crowley's Cheese Factory
Ira...............................Riverside Cheese Factory
Mt. Holly.......................Tarbleville Cheese Factory
Mt. Holly........................Mt. Holly Cheese Factory
Middletown Springs......Chas. M. Bull Creamery Co. Station
Pittsford.........................Rutland County Creamery
Pawlet...........................Park View Cheese Factory
Pawlet..............................Cloverdale Creamery
Proctor..................................Proctor Creamery
Poultney.........................Hudson Valley Creamery
Poultney......................Borden's Condensed Milk Co.
Rutland City.......................Rutland Creamery Co.
South Wallingford..................C. Brigham Co. Station
Shrewsbury.......................Gleason's Cheese Factory
Shrewsbury...................R. E. Plumley's Cheese Factory
Shrewsbury....................W. E. Aldrich Cheese Factory
Sudbury...............................Otter Creek Creamery
Wallingford.......................C. Brigham Co. Factory
West Rutland.....................Smithlawn Cheese Factory
Wells............................Lewisville Cheese Factory
Wells...............................Eureka Cheese Factory
Wells.........................Cold Springs Cheese Factory
Tinmouth...........................C. Brigham Co. Station
Tinmouth...............................Tait Bros. Factory
Pawlet...........................Blakely's Cheese Factory

Washington County.

Barre..................................Cobble Hill Creamery
Barre...................................Barre City Creamery
Middlesex...............................Middlesex Creamery
Calais..............................East Calais Creamery Co.
Marshfield....................Marshfield Co-op. Creamery Co.
Northfield.....................................A. E. Bryant
Moretown..............................Cold Spring Creamery
Waitsfield..................Mad River Valley Co-op. Creamery
Montpelier City.........................Montpelier Creamery
Plainfield.........................Plainfield Co-op. Creamery

East Montpelier..............East Montpelier Co-op. Creamery
North Montpelier..........North Montpelier Co-op. Creamery
Cabot.................................Cabot Creamery Co.
Warren..........................Warren Co-op. Creamery Co.

Windham County.

Newfane......................Windham Co. Creamery Ass'n
Putney....................................Putney Creamery
Westminster................................Valley Creamery
Wilmington..................Deerfield Valley Creamery Ass'n.
Brattleboro.....................Brattleboro Creamery Ass'n
Wardsboro......................Branch of Newfane Creamery
Londonderry...................Londonderry Cheese Factory
South Londonderry..................Mount Lake Creamery
Whitingham...................... North River Creamery Ass'n
Dummerston.........................Dummerston Creamery

Windsor County.

Rochester............................ Standard Creamery Co.
Chester Depot......................C. R. Hazen Creamery
Chester Depot...........................Chester Cheese Co.
Barnard............................Silver Lake Creamery
East Barnard.......................Clover Valley Creamery
Norwich........................H. P. Hood & Sons Creamery
Pomfret.........................Sherburne Creamery Prop.
Sharon.............................Sharon Co-op. Creamery
Cavendish.........................Batchelder & Snyder Co.
Bethel.............................Harrington Creamery
East Bethel..............................Storrs Creamery
Windsor...............................Hillside Creamery
Weston............................Weston Cheese Factory
Plymouth.......................Plymouth Cheese Factory
South Reading..............South Reading Cheese Factory
Woodstock.....................H. P. Hood & Sons Creamery
Pomfret—P. O. Woodstock............ Cloudland Creamery
West Windsor....................West Windsor Cheese Mfg. Co.
West Hartford............West Hartford Creamery Corporation
West Hartford....................Howard's Creamery Prop.
Hartland.............................Hartland Creamery
Hartland Four Corners..........................Brookside
Royalton...............................S. &. F. Creamery
South Royalton............................Waldo Creamery
Waterbury.....................E. R. Towne & Co. Creamery
Waterbury.................. Winooski Valley Creamery Ass'n
Montpelier City.....................Crescent Creamery Co.

NOTE—Your Secretary would consider it a favor if any of the members would notify him of any changes in the above list.

TABLE OF CONTENTS.

SEVENTH ANNUAL REPORT

OF THE

Vermont State Horticultural Society

PROCEEDINGS

OF THE

Fifteenth Annual Meeting

Held at Newport

NOVEMBER 17, 18, 1909

MONTPELIER, VT.
CAPITAL CITY PRESS
1910

LETTER OF TRANSMITTAL.

To His Excellency G. H. Prouty, Governor of Vermont:

Dear Sir: In accordance with the requirements of law, I have the honor to transmit to you the Seventh Annual Report of the Vermont State Horticultural Society.

Respectfully submitted,

M. B. CUMMINGS,

Secretary.

OFFICERS OF THE VERMONT STATE HORTICULTURAL SOCIETY.

PRESIDENT.

George W. Perry .... Chester Depot

COUNTY VICE-PRESIDENTS.

Addison	E. L. Wright, Middlebury
Bennington	C. E. Knapp, No. Bennington
Caledonia	E. H. Hallett, St. Johnsbury
Chittenden	W. H. Holcomb, Burlington
Essex	H. L. Ames, Island Pond
Franklin	H. K. Brooks, Swanton
Grand Isle	D. T. Trombly, Isle La Motte
Lamoille	Geo. H. Terrill, Morrisville
Orange	Dana Morse, Randolph
Orleans	W. E. Robinson, Newport
Rutland	D. C. Hicks, No. Clarendon
Washington	C. O. Ormsbee, Montpelier
Windham	A. A. Halladay, Bellows Falls
Windsor	Geo. W. Perry, Chester Depot

SECRETARY.

M. B. Cummings .... Burlington, Vt.

ASSISTANT SECRETARY.

J. W. Wellington .... Burlington, Vt.

TREASURER.

A. M. Vaughn .... Randolph, Vt.

AUDITOR.

C. W. Richmond .... Newport, Vt.

EXECUTIVE COMMITTEE.

G. W. Perry	Chester Depot
E. S. Brigham	St. Albans
M. B. Cummings	Burlington
T. L. Kinney	So. Hero
E. L. Wright	Middlebury

ADDRESS OF WELCOME.

GOVERNOR G. H. PROUTY.

Mr. President, Ladies and Gentlemen:

I believe that it is my task, or my pleasure rather, to bid you welcome to this village of Newport, and I do this with all the more pleasure because I believe that it is proper and best that this Association should have come here at this time, possibly not best for the Association, but at the same time I am in the hopes that in the future the efforts of your Association will result in good. At your meeting in Montpelier I suggested that you come here, saying to you that the people of this vicinity would manifest some interest in your work. I believe it is because of that invitation that you are here, and want to thank you for acceding to that request. You are exceedingly welcome because this community is a progressive, prosperous one and desires to keep up with all the good things which are going on in the State and the Nation.

It is absolutely necessary, before any great movement takes proper effect, and before it develops all the benefits which are to be derived from it, that a great amount of agitation be carried on, and that is what you are doing. You are agitating some of the questions that are vital to the State and the Nation. There is no question that the growth of population in the United States is such that horticulture must increase; that we must learn more about intensive farming; that we must, in a more scientific way, cultivate the land which we have and learn to bring out from it results more beneficent than at present.

I have never been impressed with this idea more than during my trip through the South a short time ago. As I went to St. Louis and saw there what great strides had been made in manufactures and what a great center it is, there was no question in my mind but that ultimately that country is going to be the great manufacturing center of this whole land, so much so that, if agriculture and manufactures increase for the next ten years as they have during the last decade, the railroads will be unable to carry the products of the farm and the factories. It will be absolutely necessary to open up those water highways about which we have been talking during the last few months. This only goes to show what the development of this country is going to be. If New England is to keep up with the West she must be just as progressive, and it is because of this that you gentlemen are trying to educate the people to treat their farms in a scientific way. We all remember when such men went around and talked scientific agriculture, and after they had gone people laughed at them, and they had

pretty good reason to laugh, for if you had gone back to their farms you would have found that they did not put into practice what they talked. It was things like that which prevented people from believing in scientific agriculture, but that is all changed. We have only to meet at such times as this, and hear such earnest words as we have this morning from your two vice-presidents, to be assured that you are doing a great deal of good along this line and that these interests are being taken up in a scientific way. There is great necessity for taking these matters up as you are doing.

I believe that Mr. Hawes said he had never been officially welcomed to this town; I want to officially welcome him, and I do it with a great deal of pleasure because I believe he is representing one of the greatest movements which this State has undertaken. The question of forestry is one of vital importance and one that should be considered. Possibly the forester has some ideas which I, being a practical lumberman, don't believe in, but it is necessary that we have a man like him who has ideas, and it is necessary that the State of Vermont should be willing to show what the possibilities of our State are along this line. Unless your agitation for replanting to forests the old, worn-out lands of this State is carried out by the State itself, it will not become a success. I have not always believed this, but I do now. The State has started in the right direction, and before many months I expect to see at least one tract of land in every county being managed by the State as an example that the citizens may see what it is possible to do. They won't all carry on their forest tracts the way the State does, but they will find out some improved way of carrying them on and making them more profitable.

It would mean a great deal if some young man should start out with a tract of land which is worth practically nothing to-day and plant it to trees and care for it until he got to be old, for then it would provide for him. That is not an ideal, but something practical, and while it is some expense, we get no good without expense. If the State is going to do all it can for its citizens and help them improve their condition as much as possible, then the people must spend some money in helping on these movements. You cannot make any business successful unless you take hold of it, advertise it, and spend a little money developing it.

Of course this year has been very bad for the apple crop, but there is a good year coming and there should be a system of developing and caring for apples in this State which will be of value in the future. We know that the best makers of maple sugar are able to sell their product direct to the consumer. Any apple grower who puts up his apples in an honest, straightforward way and sells them direct to the consumer will never want for a customer, but only by doing it in this way can you secure lasting benefit. It is no use to put up apples with the little ones in the center; the only way is to be strictly honest about it. I hope the time will

come when the State will take hold of this matter and that every apple that you put up will be packed under its supervision or at least some kind of supervision, so that fraud will not be perpetrated. I do not think there is anything which would add so much to the apple crop of this State as some such inspection as that.

I am here to give you a word of welcome and thank you for holding your meeting in this place. It gives me great pleasure to do this because I remember hearing my father tell how, when he was twenty-one years old, he purchased a farm down the lake about five miles and started out on his married life. He went to raising hops and paid for his farm in two years by so doing. He also planted some apple trees but later sold that farm and came up here and bought another on which were good apple trees, in fact there were apple trees on almost every farm in town; to-day you can find hardly any good apples raised in this vicinity. At one time we had a great horticulturist here, Dr. Hoskins, and we see the results to-day of what he tried to do, but his successors have allowed the orchards to go to ruin. It was because I believed that we ought to raise apples in this vicinity that I wanted you to come up here this year. I wanted to see if the farmers of this section would not take hold of the matter and do what they ought to in regard to the raising of apples, and while I am not a farmer and never expect to be, at the same time I am interested in everything which shall be for the benefit of the general public, and I believe that this is one of the best things to be taken hold of at the present time. It seems to me that this section should be ideal for the raising of apples. The frosts are delayed by our proximity to the lake and do not come until after everything in the shape of corn, at least, has been cut down for two or three miles back. It seems to me, therefore, that the farmers should take hold of apple raising and do what they can along that line.

I want to thank you again for coming here, and assure you that while you have not a very large audience to-day, the community showed you last night at least that they did welcome you, and I can assure you for them that they are very glad indeed that you are here.

RESPONSE TO THE GOVERNOR'S ADDRESS.

PRESIDENT G. W. PERRY.

Your Excellency, Ladies and Gentlemen:

We do not really need, this morning, this address of welcome, although we are glad to have it, because, from the time it became necessary to begin the preparations for this meeting when in Newport, our vice-president in this county and the governor and every one else, so far as I know, have done everything within their power to make us welcome. So when we arrived on the ground, we found a very warm welcome awaiting us and very ready hands to help us. I have not had many years' experience with this society, but I don't remember any other place where we have found quite as welcoming a town. But, although we knew all about it yesterday, it is pleasant to have the governor voice that sentiment to-day. I confess that a year ago, when he asked us to come to Newport, though I knew that the governor's say-so had to go, I had my doubts about it, and continued to have them until the fruit was spread out yesterday; but now I am very glad we came here.

We have learned to appreciate some of the things that have a value in Vermont. We have crept up step by step until to-day, according to the report that I saw in the paper a few days since, this little State of Vermont has become number one in the whole country in the production of stone. That is to say, we are producing more marble than all the rest of the country together, we are number one in granite, number two in slate, and very near the head in the production of limestone. Our Green Mountains, that we thought a few years ago were in the way of our farming, are now coining great wealth for us.

We have often failed to appreciate the valuable things we have in Vermont. For instance, fifty years ago we were breeding in this State the best family horse the land ever knew; a horse having kindness, intelligence, endurance, long life, every excellence; and then our farmers went daft with the craze of raising trotters to make themselves rich, and began to breed horses with long necks and long legs, that had to be wrapped up in cotton batting every night and cared for as tenderly as a sick child. And almost invariably, if one of them did succeed in raising a trotter, it ruined him as a farmer and in every other way. We have now found out our mistake and have begun to appreciate the Morgan horse; we have invoked the aid of the national government to help us put him on his feet again; and give him a standing equal to, if not superior to, that which he had half a century ago.

More than a generation ago we put ourselves at the head of the fine wool business of the world, and even to-day from Australia, South America, South Africa and New Zealand, they come to Vermont for their stock, and it is still true that sheep are shipped out of the State that bring $500.00 a head. Yet our people are letting the finest sheep lands in the world grow up to ferns and bushes.

I will now go back to the subject of our meeting. Fifty years ago, when the Morgan horse and the Merino sheep were at their height, we had an apple in New England of surpassing excellence. I can remember how, in every little orchard, the trees hung full of the scarlet fruit, and the ground was covered with the fallen specimens. It was our most common apple in many parts of New England. It was not only beautiful to look at, but it had such a fragrance that a single specimen would scent the whole house; and, when you bit into it, you found it crisp and juicy, and of a flavor never to be forgotten. It was an excellent cooking apple, too. No doubt it was a shy bearer; but, having found out the reason, we can now make it one of our most abundant producers. The managers of the recent New England Fruit Show evidently did not know about it very well, as they offered no premiums for it in boxes or barrels, and in the list of plate specimens, put it down in the third class, instead of in the first class with the Baldwin, Spy and McIntosh. But the gray-headed men and women of Boston have not forgotten this apple which they used to eat when they were farmers' boys and girls. For if you had a hundred barrels of good-sized and good-colored ones in Boston tomorrow, you could sell them before night for a thousand dollars. Yet we are letting this apple pass out of existence in Vermont and allowing our friends of the Hood River Valley to use it to capture the best markets of the world. Do you realize what a rare and valuable thing a fine apple is? When they offered the premiums at the New England Fruit Show, they chose only five kinds as worthy to compete in boxes and barrels, the Baldwin, McIntosh, Rhode Island Greening, Northern Spy and Gravenstien. You can count on your two hands all the varieties that are worth raising commercially, and every one of them was a chance seedling. All the Burbanks of the world have never produced their like. At the head of all apples, stands the Spitzenburg, a double king, because the apple is the king of fruits and the Spitzenburg is the king of apples. It is perfectly hardy in Vermont. There are some trees in Grand Isle county nearly, if not quite, a hundred years old, and they are bearing apples to-day. Now, if it is wise to rehabilitate the Morgan horse and put him on his feet again, is it not wise to rejuvenate the Spitzenburg apple, until our orchards are hanging once more full of its ruby fruit, our cellars are again rich with its treasures and our tables glorified with its beauty and surpassing fragrance?

There are Spitzenburgs and Spitzenburgs. The nurseryman has only one kind and that is generally poor enough. If we are to restore this apple to its kingdom, we must hunt up the old trees and get our cions from those. Then we can top-graft a lot of our worthless sorts, leaving a few branches of the old stock to continue to bear. The government discovered a few years ago that a few fruit trees are self-sterile, and must be crossed by the pollen from some other sort, and one of these is the Spitzenburg apple. So when you top-graft all your worthless apples, as of course you will after hearing me to-day, if you leave on a few of the branches, for the bees to cross with, you will have those trees loaded with fruit nearly every year. In the section where I live winters, the pastures are full of great trees that came up themselves, that nobody ever pruned or cultivated or sprayed. From our station train loads of cider apples are shipped away every year, yielded by those wild trees. Now it would be possible to topgraft and prune these old trees, and in three years' time have them bearing Spitzenburgs, for this apple does well as a pasture fruit. Their product would then bring $6.00 a barrel, instead of the 37 cents which it brings to-day.

FORESTRY IN VERMONT.

(ILLUSTRATED LECTURE.)

A. F. HAWES, STATE FORESTER.

Forestry in its purposes and methods is quite distinct from horticulture, and in some sections of the country it would seem out of place to discuss forestry at a horticultural meeting. In Vermont, however, conditions are so diversified that almost every farmer finds that he has some land better adapted for timber raising than for dairying or fruit culture, and the measures which a forester would suggest will depend upon its present condition, i. e., whether he will advise a careful marketing of the mature timber; the improvement of the young growth by thinning or the planting of waste land or cut over land with forest seedlings. We do not expect that farmers throughout the State are going to adopt the most approved forestry principles immediately, for only in a few cases have they adopted improved methods in horticultural lines, which bring more immediate results than does forestry. The result of the forestry agitation, for a few years, as far as it affects farmers, will be rather indirect and intangible. But as farmers throughout the State get to thinking more and more of the woodlands as a money-producing part of their farms, they will unconsciously adopt the first steps of forestry. I want to point out here what I believe these first steps will be.

In the first place every farmer must see that the price of timber (both soft and hard) has increased very considerably during the past ten years. A concern in Barnet reports that they have to pay from $3 to $4 more per thousand than was necessary ten years ago; while the owner of a stationary mill in Jonesville, on the other side of the State, says that he pays $5 to $7 more and that the quality of the timber is much poorer. The reason that prices have increased is that the virgin forests of the whole country are being exhausted and the chief supplies now on the market have to come from points very far from the market. Increased stumpage prices and high transportation charges have affected our own local prices. The United States has been the great exporter of timber, and before many years it will cease to export any great quantities; Canada will probably levy an export duty and the price of lumber in the United States will be regulated by the world supply, just as the price of wheat is now regulated, not by the American supply, but the world supply. This means that prices of lumber will continue to rise

although there may be temporary setbacks as last year, and it should influence the farmer who contemplates cutting thrifty growing timber to hold it if he possibly can. This, of course, does not mean that over-mature timber should be held.

Another condition well known to every farmer is the fact that many farms are sold for the value of the lumber on them. This not only points to the need of more carefully estimating the stand, but shows the farmer that unless he wishes to give away his farm, he should sell the lumber separate from the land, i. e., he should either sell stumpage, or be his own lumberman. In most cases lumbermen do not care for the land except to sell after the woods have been stripped.

On the other hand, the farmer who contemplates selling his farm must realize that it will sell for much more if a portion of it is covered with thrifty growing forest. This, in fact, is the chief reason that has led many farmers to plant up part of their land with forest seedlings. They do not expect to see the trees mature, but believe that they will help sell the farm.

But whether the farmer plants or not, he can see to it if acting as his own lumberman, or even if he sells stumpage, that the young growth is not broken down any more than is absolutely necessary. The old trees should be felled into the openings, and in swamping them out none of the young growth should be cut. Small spruce and hemlock grow much more rapidly after light is admitted by a cutting.

This brings us to another phase of the subject, that of cutting Christmas trees. It is poor policy to try to keep in pasture, land which is better fitted for forests, while, of course, a certain amount of first class pasture is needed on every farm. Only recently a farmer in Barnet told me that ten years ago he paid over $100 to have the little pines cleared out of his pasture, while now, he intends to spend more than that in replanting the same land to pine next spring. Some forestry enthusiasts have gone so far as to denounce the cutting of Christmas trees, but I believe that is a wrong attitude. The farmer has just as much right to sell a spruce eight feet high for a Christmas tree, as to sell one 30 feet high for pulp or one 60 feet high for lumber. It is no more in keeping with our American principles to prohibit the cutting of Christmas trees than it would be to pass a law against the renting of farms on shares. The first prevents the growth of a forest; while the second usually results in deterioration of the soil for lack of fertilizer and care. What the farmer should do is to make a good profit if he sells Christmas trees and not give them away as has been done so largely in the past. Lumbermen and farmers planted in Vermont this spring 200,000 trees at an average cost, when planted, of one cent apiece. If in their judgment a seedling one-half a foot high is worth one cent, how much more is a Christmas tree worth which has fifteen years' growth and is eight feet high? And yet, farmers have been

getting only one and two cents for these trees, which sell in Boston and New York for $1.00 to $2.00 apiece. Farmers should realize that these trees are constantly increasing in value and not sell them except at a fair price, three to ten cents. Some men are already interested in planting land for the sole purpose of raising these evergreens for the market and I believe there will be a good profit in this kind of investment as soon as land owners realize their value.

To pass on from the seedling: What shall we do, when lumbering, with spruce and pine six to eight inches in diameter. A week ago I went through a lumber job where French-Canadian choppers were cutting spruce trees even smaller than this for lumber. Now the average contents of spruce trees, 40 feet high, is according to their diameter, as follows:

Diameter.	Cords.	Feet B. M.	No. of trees per cord.	No. of trees per M. ft.
5″	.015		66	
6″	.026		40	
7″	.040		25	
8″	.054		19	
9″	.066	or 27	15	37
10″	.080	or 34	12	29

Rough spruce delivered at mills brings $7.25 per cord and peeled spruce, $8.75. It is easy to see that the cost of cutting, peeling and hauling nineteen eight-inch trees is considerably more than twelve ten-inch trees and there certainly can be but slight profit from cutting forty six-inch trees to make a cord. Supposing that these had a stumpage value of $2.00 per cord, the value of each tree standing would be but 5 cents apiece, or little more than that of a Christmas tree, two inches in diameter.

THINNING AND PRUNING.

There are two lines of work which are often confused by land owners: "thinning" and "pruning." Thinning consists of removing a certain number of trees from a wood for the purpose of improving the growth and character of the remaining trees and is one of the chief measures recommended by the forester. Pruning, on the other hand, is the removal of limbs, and in forestry work is seldom recommended.

Trees are dependent upon the soil for certain minerals, namely: potash, lime, iron, magnesia, sulphur and phosphorus and nitrogen. The root systems of trees are so diversified that these minerals are almost always obtainable in any forest soil, but they can only be taken up in the form of very weak solutions. The supply of water in the soil is, therefore, more apt to be short and thus influence the growth of the trees than is the quantity of

minerals. Most of the water imbibed is transpired through the foliage but a certain portion is used for the formation of tissue. Different species of trees make various demands for moisture and the demand on the part of the same species varies with soil, climate, exposure, etc. The finer the soil and the greater the mixture of humus, the more moisture will the soil hold. For all kinds of woodland crops there is on the one hand, a minimum supply of water requisite for thriving and healthy development, and on the other hand, a maximum beyond which any surplus of moisture is prejudicial to tree growth. While some trees, as the pine, can thrive on drier and sandier soils than others, such as the maple and beech, they all do better on a moist loam or soil with some mixture of clay. The best indication of the quality of a soil for tree growth, both as to mineral and water content, is the height growth of the tree. For example, a study of the white pine in Pennsylvania showed the average height of pine in fifty years was as follows:

Quality I	64 feet.
Quality II	46 feet.
Quality III	30 feet.

Light is as essential to tree growth as water and the minerals above named. By the action of light on the chlorophyll contained in the leaves, there is a decomposition of the mineral solutions taken up through the roots and of carbonic acid which has been taken in from the atmosphere. This is followed by the manufacture of substances that form the tissue of the tree. The amount of light necessary for different kinds of trees varies considerably and can be judged by the foliage. Thus a tamarack with its delicate, light foliage, requires a great deal more light than a maple with a large crown of dense foliage.

The two essentials which regulate the development of a forest are these: soil moisture and light or space. So long as a healthy tree has plenty of both water and light, it will grow well. If water is cut off by lowering the water-level in the soil, the trees become stag-headed and die. This is why many trees die about new houses where the water level has been changed. If the trees become so crowded that they only get light from above, the lower limbs die out, they become splindling and gradually die.

The tree that grows out in an open pasture has an unlimited supply of both moisture and light. The lower limbs have the same opportunity for light that the top has and, therefore, the tree develops a very limby character, much of its food going into the production of limbs instead of a tall trunk. All these limbs are producing a wood material which must be deposited below the base of the limb in which it is made. So the base of the tree becomes larger and larger as its limbs grow, and the log, when cut, will not only be very knotty, but so tapering that only narrow boards can be cut at the top.

The development of a tree in a forest is quite different. Imagine, for example, a plantation in which the trees are six feet apart. In about six years, the lower limbs of these trees come together and soon begin to crowd each other. By fifteen years many of these lower limbs will be killed out. Gradually they drop off, leaving a smooth trunk. As the tree can only gain light from above, every effort is put into height growth and the main height growth is made during the first part of a tree's life.

The growing part of trees grown in a forest is always the top. The food that is made is not wasted in the production of large limbs but is deposited in the crown so that the log produced is not only free from limbs but well-filled out at the top. Boards cut from such trees will be free from large knots and will be nearly as wide at the top as the bottom.

During the struggle for existence, not only are the lower limbs killed out, but many trees become suppressed by their more successful competitors. Left to nature's ways, the struggle may become so intense that almost all the trees will be weakened. Their side branches may be killed too far up into the crown so that they become splindling and their tops produce very little wood. A study of natural groves of white pine in New England illustrates the severity of this contest as shown by the following table:

Age Years.	Average height, feet.	Number of trees per acre.	Number of trees dying per decade.
10	5	2220	
20	14	1600	620
30	32	1090	510
40	54	690	400
50	68	400	290
60	76	260	140

In our forest management we must consider whether it pays to allow this struggle to go on uninterrupted. It is not enough to go through our forests and remove the dead trees. While this may improve the appearance of the forest and may in some cases produce a small income, it does not effect the growth of the remaining trees. In order to produce the best results, we must keep a little ahead of nature's method, by allowing each tree that is to remain, ample room for the development of its crown. The best trees should always be left and only those trees cut which will interfere with their development. This thinning should not be made until the trees are about twenty years old. It is better to make repeated light thinnings, say every six or eight years, than heavy thinnings which will expose the trees to the effect of wind and ice storms. No openings should be made as this results in the growth of grass and weeds and the drying out of the soil. In selecting the trees to be left, one should choose trees of well-developed crowns. Usually in the case of spruce and pine, the

crown should occupy at least one-third of the total height. In a tree whose crown does not occupy more than one-fifth of the total height, the development of wood material will be inadequate to produce much growth.

Another thing to be borne in mind is that a thinning made just before a seed year of any species results in a great increase in the amount of seed produced, so the reproduction of adjoining areas or openings may be affected thereby.

The selection of the trees to be removed is based upon species and condition. As a rule in Vermont, the trees to be most favored are: white and red pine, spruce, sugar maple, white ash, basswood, yellow birch and, wherever they occur, hickory, red oak and chestnut. Those which might be sacrificed to benefit thrifty specimens of the above are: hemlock, fir, pitch pine, butternut, beech, poplar and elm. A few trees, such as the ironwood and bird cherry, should almost always be cut so as to prevent the seeding of these worthless kinds.

No hard and fast rule can be laid down for thinning. It will not do, for example, to say that every other tree should be cut, or that in clumps of five sprouts, one or any definite number should be cut. Neither can we say that a pitch pine should always be cut when crowding a white pine or a beech when crowding an ash. If the pitch pine is straight and the white pine crooked, we should reverse the rule, and if the beech is sound and the ash unsound, the ash should, of course, be cut.

As to number of trees or amount of wood which should be thinned out, it is only necessary to repeat that frequent light thinnings are better than long-deferred heavy thinnings. As the trees removed are always of the smaller sizes, the percentage of number of trees taken out is greater than that of the wood cut. As a rule, from one-fifth to one-quarter of the standing wood is cut. So on a tract bearing thirty cords to the acre, from six to seven cords would usually be cut.

Many have the impression that the removal of underbrush is a desirable measure. From a forestry standpoint, it cannot be recommended. The material removed has no value to compensate for the operation which is quite expensive. Undergrowth usually sprouts readily and grows up more luxuriantly than ever. It is more of a benefit than an injury to the forest since it shades the ground, prevents evaporation and adds to the humus by its decaying leaves and twigs. In some cases, it interfered with the growth of seedlings. If a forest is of proper density, there will be little trouble from underbrush. A few shrubs, such as laurel and rhododendrons, are exceptions, and, while they are very beautiful, they are a serious enemy to the forest.

PRUNING.

No attempt is made here to consider pruning in its relation to shade, ornamental, or fruit trees. From a forestry standpoint pruning is a very questionable operation. The need of it is always an indication of poor forestry in the past; for, as has been shown, trees grown closely together will prune themselves.

In many parts of Vermont the spruces which come up on old pastures are known as "bull spruces" and by many are considered a different kind of tree from the spruce of the forest. The only difference is that, grown in the pasture, they have the limby character and are better fitted for Christmas trees than timber. As they grow up there will be many thickets where natural pruning takes place. Others out in the open will always be limby unless these limbs are pruned off. Pruning these larger limbs results in much bleeding of the tree, in the loss of the food material which the limbs would produce, and results in the formation of loose knots, worse defects in lumber than the knots of live limbs. Such trees should never be pruned.

In dense stands of pine, spruce, cedar and other conifers the dead limbs often persist on the trunks making it difficult to walk through the woods. There can be no objection to knocking these limbs off with a club, although little is to be gained by it from a forestry standpoint. It is probable that the removal of a few small live limbs will not injure the tree if cut close to the trunk with a sharp ax so that the wounds will readily heal over. No live limbs more than an inch in diameter should be pruned from conifers. In fact, the opinion of the best German foresters and of most lumbermen in America is against pruning any live limbs from conifers.

With hardwoods the question is simply whether the trees will be enough benefited to repay the expenditure, except to form the shape of young trees by the removal of one leader or some of the lower branches pruning cannot even here be considered a profitable operation. Any pruning in hardwoods should be done in summer.

Forestry planting is a phase of forestry which appeals to a great many and is of great importance in Vermont.

SELECTION OF STOCK.

Black or yellow locust makes a good tree for fence posts, railroad ties, etc., but should only be planted on the better classes of soil because on sandy soils it is more apt to be attacked by the locust borer.

Norway Spruce is similar to the native spruce, except that it is more rapid growing, and, if anything, is a more valuable lumber. It is adapted for planting on any of the better forest soils and

especially in the mountains. It should not be planted on sandy lands.

White pine is suited for any kind of soil in Vermont and is on the whole the best tree for forest planting, because it is most rapid growing, the most valuable timber and produces the largest crop per acre.

Scotch pine is similar to white pine but will thrive on dryer sand or wetter swamps than white pine, in other words, is even less fastidious. It is more rapid growing in youth, but the timber is not as valuable as that of white pine.

AGE OF STOCK.

For the pines three or four year old stock is preferable. Two year seedlings can only be advised for land that is free from brush and strong grass growth. On old pastures they are nearly as satisfactory as older stock. If it is intended to plant land which has much of a brush growth we would advise that these two year seedlings be set out in the garden for a year and then be transplanted into the permanent side. In the garden they should be set about three inches apart in rows that are a foot or more apart so as to allow cultivation between the rows. In these nursery rows the stock should be kept carefully cultivated.

Spruces. Two year old spruces should never be planted out in the permanent site, but always in nursery rows for a year as described above.

One year locusts are from one to three feet high and are quite large enough for permanent planting.

DIRECTIONS FOR PLANTING.

Time of planting. The sooner the planting is done after the frost is out of the ground in the spring the better. Evergreens should not be transplanted late in the season, after they have begun to grow, unless it is late in the fall. In Vermont the best season is usually from April 15 to June 1.

Unpacking stock. On the arrival of the seedlings they should be planted as soon as possible. If they cannot be planted at once they should be heeled in near the land that is to be planted. Dig a ditch preferably under shade, and after untying the bundles cover their roots with earth in this ditch. Shade artificially if necessary.

Puddling. Just before planting prepare a thick mud, preferably with clay. Take a few hundred trees from the box or ditch and dip their roots in this mud. Then place them in a basket or pail and cover the roots with wet moss or cloth.

Spacing. Dense planting is desirable so that the trees will automatically prune their lower limbs, and will make a better

height growth than with wide spacing. After the lower limbs are killed the trees should be thinned. Planting 6 by 6 feet gives 1200 trees per acre; 5 by 6 feet gives 1500 trees per acre.

Planting. The mattock or grub hoe is the best tool for planting. First scrape away the sod, then bury the mattock blade, twist handle to right making a hole at the side of the blade. Insert seedling before removing blade, and after removing mattock, press soil with foot firmly about the roots of the seedling. Great care should be taken not to allow the roots to dry out. Five minutes exposure to the air is long enough to kill them.

Crew. Four men can work to best advantage; three men with mattocks each following a straight line across the field,—these lines kept approximately six feet apart. The fourth man or boy carries the trees in a basket or pail strapped over his shoulder, and passes them out to the other three. A crew of this kind can plant 2000-4000 trees a day according to the kind of land.

Cost. The cost varies considerably with the kind of trees used and the character of land. Allowing 1200 trees per acre the cost of trees is as follows:

1200 @ $3.25	$3.90
1200 @ 5.00	6.00
Cost of planting @ $1.75 per M.	2.10
Cost of planting @ 3.50 per M.	4.20

Total cost varies from $6.00 to $10.20 per acre. As a matter of practice the larger the area planted the cheaper will be the rate per acre.

Success of planting. The percentage of trees which live depends very largely upon the care taken in planting and the weather conditions prevailing for the first two months after planting. Under favorable conditions many plantations have passed through the first year with a loss of less than 5%. With careless planting or a drought during the spring the loss may be as high as 15% or more. Usually there is very slight loss after the first spring.

Subsequent treatment. Plantations must be protected from fire and grazing. Cattle break off the tops of the seedlings by rubbing against them, and must therefore be excluded. No cultivation, watering or fertilizing is necessary. We do not advise pruning of live limbs and the plantation will, therefore, require little treatment for many years.

The State Nursery is prepared to furnish any of the trees described above, and a price list will be sent upon application.

HARVESTING AND MARKETING APPLES.

(ILLUSTRATED LECTURE)

E. CYRUS MILLER, HAYDENVILLE, MASS.

Mr. President, Fruit Growers and Friends of Vermont:

It is gratifying to me to be here tonight, and I want to bring you the greetings of the fruit growers of Massachusetts.

There is more and more interest being shown in the growing of all horticultural products than ever before. Even the governor of our Commonwealth is a fruit grower, and while we have all come here at the invitation of your governor, I trust that when you go away, he will be more interested in the growing of apples.

I also bring you the greetings of the Pomological Society of Maine. At the last meetings of that society, it was the opinion of all, that never in the history of the society was there so much horticultural interest as at the present time. We are on the verge of a new era in regard to the successful growing of fruit.

Before we proceed with the slides, I want to speak of a few fundamental principles that underlie the growing of apples. The starting point in all our horticultural work should be the improvement of the orchards which we have already established. Take out every other tree where the orchard is too closely planted, and then give good care to those that are left. The day is past when we can bring up a colt or calf or any other animal without giving them some care and attention. We cannot grow crops without giving them the very best care and attention, and the same thing is just as true in regard to the growing of apples. We must give some care to the trees that we already have; we must look to the good name of the apple industry in New England, and in order to do so, we must improve the old orchards. Let us prune our old orchards, extending the work over a period of years, painting all wounds with lead and oil, and produce an environment about those trees whereby they can make a respectable growth of wood and give us good marketable fruit. Let us spray those trees. We know that our largest and best fruit growers depend as much upon spraying their fruit as upon any fundamental work connected with it. Let us help them; we will have better fruit and more of it. The fruit industry in New England will take on a different appearance.

In regard to the establishing of new orchards, I believe there never was a time that was so promising for it as to-day. We have a soil suited to the growing of apples, a climate that is favorable to it in the very highest degree, and altitudes that are very essen-

tial to the growing of fine fruit, and then we have the markets near at hand which will take all the finest fruit we can grow. I would encourage the young men to take up this subject of apple growing and make it their life-work, because in that line, there are as large opportunities as can be found in any other. I know of apple orchards that have been planted twelve years which have netted six percent on a $1,000 an acre. Is not that a good business proposition? Further than that, I believe that there is nothing in the line of horticulture that presents such a wide field of possibilities to the young men of to-day as the growing of apples. A person is only limited by his own capacity to extend and develop this special line of agricultural work.

In business life, it is the wise man who may look ahead and see certain things in the future, and so it is in regard to the growing of apples to-day. It is the wise orchardist who may plan his work from the start so that when he comes to the harvest, he may find a type of tree that will facilitate all matters pertaining to the harvesting of the fruit. We hear much of the trees of the West which are described as the low-headed trees. My ideal of a low-headed tree is one whose lower branches, when loaded with fruit, will just touch the ground. In pruning, have the branches so that they may be reached from the ground. To illustrate the possibilities in apple culture, I will say that the year in which this picture was taken, there was a tree that was twenty years planted that produced ten barrels of marketable apples which sold for three dollars per barrel, and not occupying not more than three square rods of land. You can realize how much can be produced from an acre of land. This same tree produced this year twelve barrels of apples which sold for $3.25 per barrel, and this, in my opinion, is the ideal type for us to strive to produce in our orchard work.

My idea regarding the harvesting of fruit is that, instead of their being left in the fields in piles or packed in the fields, to remove them at once to some cool, dry place, where, at a later period, they may be graded, packed and shipped. I have tried all plans for packing, in the field and of taking them to the storage building, and I favor the latter method. The disadvantage of trying to do the work in the field calls for more help than one usually can find. Again, there may be cold, wet storms and the work of harvesting and packing is interfered with. As a rule, the quicker the fruit is taken from the trees after it is ready to pick, the better the results will be, but it is seldom that you find a farmer with a place where his fruit can be protected from the elements and kept in a better condition than in the field. The method of leaving the apples out under the trees is out of date. The buyers prefer the practice of taking the fruit into a storage house.

Now about the low-headed tree. I most thoroughly believe in cultivation, and I believe that we must practice judicious cul-

tivation because it is easy to overdo it. We must have color on our fruit as well as size, and the color is the feature that gives attractiveness in the market, so we must strive in our orchard operations to give the trees a well-balanced position.

I must describe spring work in the orchards. I have spoken of believing in cultivation, and while all of these orchards have been developed in connection with the dairy industry, I have come to the point where I believe that all our bearing orchards should have nothing but cultivation. No crops should be grown in orchards that have reached bearing age. In order to conserve all the moisture that may be in the soil, cultivation is necessary, so that in hot, dry, summer weather, there will be an available supply of moisture. In New England, the rainfall is distributed in such a manner that we do not have to depend upon irrigation. Through cultivation we conserve a sufficient amount of moisture in the soil.

Think of the orchard in the blooming season, and do you not think that the vocation of growing apples is a pleasant one? Can you imagine a more beautiful scene than the picture of an apple orchard in full bloom? And further than to delight the eye, it delights the other senses. Is it not an inspiration to take better care of these trees, and is it not a vocation in which we can find as high a degree of pleasure as we can in any other line of work?

On our home orchard we have used three types of land: the best grade is what has been used in hoed crops, then the lands that have been partly cleared and are partly in brush, and forest sections that were covered with trees and stones that have been left there from the glacial period. You will see that orchard work with me has not been a pastime. On this section, which was but two years ago a forest, and covered with stone and boulders, there have been hundreds of loads of stone taken off, the result is today, a nice orchard, and in a few years, the result will be like some of the larger trees.

I am very fond of turning forest land into orchard land, and here you see a view of the preliminary operations. We have cleared out the underbrush and, a little later, will clear away the timber and take it right away to the mill on the place and sell the lumber off, and, in the spring, burn the brush, clear up the debris and plant it to young apple trees, and, in a few years, I plan to make this forest section, which may have been worth $300 for the lumber, worth $100 an acre, and have an investment that will last for many years.

I do not know how old an orchard will live to be, but it is a well-known fact that one of the best orchards in Western New York has the trees planted sixty feet apart at present, having been planted thirty feet at first, and these trees are seventy years old. Statistics tell us that apple trees do not attain their maximum bearing capacity until forty or fifty years old. As long as we can

give a tree sufficient room and proper care, it is going to continue to grow and remain in a healthy condition.

There is much scenery in our section which is not unlike that found in Vermont, and I want to say that I have passed a portion of this day inspecting the country hereabouts and want to give my testimony as to the adaptability of this locality to the growing of fruit. This locality is admirably situated for the growing of apples.

In our orchards we use a low down wagon with wheels having broad tires, a wagon carrying eighteen or twenty barrels and which will turn easily at the end of the rows.

Frequently our New England apple trees are loaded with fruit. We hear a great deal about Western trees and how they bear, but I believe that we have not begun to realize the possibilities of apples in New England, and it is perfectly feasible to get just as large returns from our New England apple trees as they do in the West if we conduct our operations along the same lines. We do not have to ship our fruit across the continent to get it to the market and pay $300 a car for freight charges. If we have confidence to do that work. we can tell just as large stories about our apples as they do in the West.

Our frost-proof storage house is ventilated, and is constructed somewhat after the plan of a refrigerator. This year we let the fruit go just as soon after picking as it was possible to pack and ship it. The lower floor has a capacity of 4,000 barrels, the upper, 3,000 barrels.

For young orchards, corn and potatoes are excellent crops; where corn is the first crop, it should not be planted too close to the tree, but rather four or five feet away so that the growth of the tree may not be interfered with.

If you were in Massachusetts and interested in horticultural matters you would be familiar with Apple Valley. It is particularly noted because it produces such a large quantity of fine fruit. It is occupied by three or four farmers who are engaged in general farming and especially interested in growing apples. I introduce this to show the products that the average farmer may get from his orchards. They are selling from $3,000 to $10,000 worth of apples each year. They are making a specialty of this fruit, and it demonstrates the possibilities of apples in New England. They believe in giving the trees as much cultivation as possible, also in spraying and pruning.

I want to say just a word about the marketing of fruit. In the first place I believe that if you are careful about the growing of fruit the marketing of it will be a simple proposition. The ideal time and place to market fruit is when it is on the trees. If we can show a buyer an orchard that has been well cared for, if the fruit is of good size and good color, there is no time when it will appeal to him as when it hangs upon the trees. My own opinion to that effect is to grow fruit on such a large scale as to attract

buyers. There are different ways, and I am going to suggest a few to you. There is no better method than to sell it just as soon as it can be gotten into the barrels; as a rule it will never average in price better than it will when sold at the earliest possible moment. I believe in every fruit grower keeping thoroughly in touch with market conditions. It is just as much a part of fruit growing as it is to grow the fruit. He should take a trade paper as well as a horticultural paper, so that he may form an opinion regarding the extent of the crop. We all know that the production of any crop is a gamble, but after growing a crop in a successful manner we may sometimes continue the gamble rather than sell out at a price which will not give us as much profit as we think we ought to have.

Then there is the selling of fruit to commission merchants. Send it at once to the commission men in the large cities. I believe that there never was a time when the commission men were of such a high degree of integrity and honesty as at the present time.

Then there is the system of cold storage in cities. Have your fruit taken out at a later period and sold on joint account.

Again there is the way of shipping our apples across the water. I think that is an excellent way for a New England grower to market his apples surely, where he grows them in a large way.

About a week ago, in Maine, I visited one of the largest apple growers of the State, and I watched his operations as he put up his fruit to go across the water. His method had been to pack his fruit just as it was picked, and shipping a car, and keeping a car moving each week till he thought other people were shipping too many, and after they had gotten through he would begin shipping again. This grower thinks the Ben Davis a good commercial apple. I believe that any apple grown as fine as he grows them must be superior in quality to the average Ben Davis. That is perhaps a good way for a large grower to dispose of his crop.

I want to say a word in regard to co-operation. I believe that is one point wherein we are weak in New England. We know that in the West their success is due to co-operation; they have forgotten to say "I" and learned to say "We." Perhaps the Hood River Valley Association of Oregon is the largest and best known along this line, and within a few years they have advanced the selling prices of their apples in boxes from $1.65 to $2.85 for their highest grade of Spitzenburgs, and that has been done by combining and acting as one individual in connection with the disposal of their fruit, and I believe that in no locality in New England is it impossible to work out a system of co-operation. In this Apple Valley that I spoke of, no buyer can go in there and buy out any one orchard; he must buy all or none. No one, who has not had experience in buying apples, can realize the expense that is involved by the dealer in picking up a lot of apples here and a lot there. Whereas, if the fruit growers of any particular locality would put the sale of the entire product into one man's hands I believe that an advance of from twenty-five to

fifty cents a barrel might be realized. No system of co-operation has ever been taken up but what has resulted in better crops, and when that spirit of competition is once aroused there is no limit to possibilities, and I want to give you as a parting thought that the spirit of co-operation in all your horticultural efforts, and particularly as it pertains to the marketing of your fruit, will bring good results.

Just one word more, if any of the members who are here should ever chance to come to Western Massachusetts, nothing would give me greater pleasure than to have them visit "Hillside Orchards."

SOME NEW REQUIREMENTS FOR APPLE CULTURE IN VERMONT.

GEORGE T. POWELL, GHENT, N. Y.

Mr. President, Ladies and Gentlemen, Members of this Society:

When your secretary wrote me asking if it would be possible for me to attend this meeting, I knew something of the conditions of your State and your society, and I said to him I would be very glad indeed, to take my time out and meet with you at this time. I also chose a subject which, it seemed to me, was necessary for me to treat because I realize that in these annual gatherings of horticulturists, in the different States of the Union, and in the conduct of the farmers' institutes that are being carried on today, there is too much threshing on old straw, and that farmers and fruit-growers are not getting out of these annual gatherings the knowledge and information which they need. I purposely took an early train yesterday morning to come up to this portion of your State by day that I could study carefully the conditions as I saw them coming through your State, and I was very glad I selected the subject I did because I see clearly that there are new methods that are required; hence I am very glad to be able to contribute something on that line this morning.

I did not see, I think, in all the way from Springfield to Newport, a single newly planted orchard. Now I have not time this morning to deal with the old orchards, only to say that we never can compete with those young, thriving, prosperous orchards of the West with the old orchards of New England, so I will give

you certain points which I think will be valuable in the planting of new orchards.

In the first place let me say, by way of advice to every man who contemplates planting orchards in the future, select the best land on your farm, not the land that you can spare most easily, pasture land perhaps, or land that cannot be devoted to the growing of crops, but choose the very best land you have.

Secondly, if it is only one acre, begin at once to improve the soil no matter how good the soil is. Now the next point is, how can you improve this soil economically? I was interested in the points made here by the first speaker giving the reports from your counties, when he said he could get along without live stock. That is true to a certain extent; I have had on my own farm 10,000 apple trees and no cows. I put tillage and clover culture together. The principle is simply this: begin to plow the orchard land that you decide to plant; grow corn, perhaps for a year or two, but keep the clover growing upon it; you can grow clover and corn together and it is surprising how successful you will be in growing clover when you begin to till the soil. There is not an acre of exhausted soil in your State; your soil will respond as soon as you give it thorough tillage; as soon as you begin to till you can grow clover because you work up this old soil. Let the sunshine get down into it and you can grow clover as successfully as you did forty years ago. I remember in speaking before the Agricultural College at Durham, N. H., the position was taken that you could not grow crimson clover in New Hampshire. I am using it for this reason; it is an annual plant and all annual plants make more rapid growth than biennials, and the crimson clover will make several inches in height while your corn is growing, and the soil will be better after you have taken the corn crop from it. I have crimson clover 30 inches high, sown the first week in July, in my orchards. This is a very brief outline of the methods which you may employ here in Vermont.

Let me go at once to the question of the trees. The next point is this, that we as yet have given too little thought and attention to the question of the propagation of trees. There is a vast difference in trees, and the system of propagation in our nurseries is not the best. A great many trees are planted that are poorly propagated. I see here on exhibition some most beautiful trees, and yet I am not satisfied to purchase and plant trees as they are taken from the nursery, for the reason that the propagation of trees is not done with reference to obtaining special quality in them. Nurserymen have not yet undertaken to propagate a class of trees as you have bred the Morgan horse in this State in the past years with reference to quality, and I want to make this point as brief as possible and yet make it plain. There is as much value in the breeding of trees, and in the selection of the stock of known quality with which we shall propagate fruit trees as there is in looking for quality in the history and breeding

of the Morgan horse; we want to propagate only from the very best quality. In estimation of trees, most nurserymen will say a tree is a tree and it makes no difference from what you take buds, but that is not a fact, for every tree represents individuality of its own the same as every animal, and I am particular in propagation to study the individuality of the tree, the various parts of the tree, because there are various portions which will produce better growth and fruit than other portions. I would advise to purchase young trees; don't plant the trees in your orchard land as soon as you buy them, but purchase yearling trees; plant them in a nursery row where you can easily cultivate and care for them, and keep them in the nursery rows for three years. Then study the trees in your own community; don't send for foreign or new varieties, but take your own standard sorts here; study the character and individuality of your home growing trees and select from them buds from the finest and most vigorous parts; find trees that have vigor, health, and strong productive qualities, that will withstand your climate well and produce uniformly fine fruit. You will find that you can increase the value of every acre of land 500 percent planted with trees propagated from selected stock in this manner.

Now let me say a few words on some particular varieties: here is one of the highest priced apples that is grown, the Tompkins county King, and yet I would not advise you to plant orchards of this in Vermont, for the King is a tree which is constitutionally defective and will not last 15 years in orchard culture, as the trees become diseased and die out quickly. While this is one of the most valuable yet difficult apples to produce, I am growing the King successfully in my orchards and this is the manner in which I arrived at the plan and obtained the results. I found in pruning that I could prune any kind of tree in my orchard with ease, but when I came to my Northern Spies I found that inside of an hour I was tired, and that set me to thinking. The harder I sawed the harder I began to think, and I discovered that the Spy was a tree unusual in its growth. Now the King is a soft wooded tree, that goes out in a few years, and the thought occurred to me, why not transfer the King over by top working to this very hard Northern Spy tree? Twenty years ago I advocated this proposition in a Nurserymen's Convention as a means of overcoming canker in the King and other trees subject to this disease, and there was not a man who agreed with me that we could take soft wooded varieties and propagate them on harder stock with fine grained wood, and not a nurseryman accepted this proposition. I went back to my farm and purchased a block of Northern Spy trees and began this work, and at the end of 20 years I have an orchard of Kings that has not shown the first evidence of canker or disease of any kind. The King is not a good producer, on the average it yields but about five barrels. In beginning this work I sent a man over Tompkins county,

near Ithaca, New York, where the King grows at its best. To find a tree that came up to certain requirements: to be 30 years old, uniform in the character of its growth and producing an even grade of apples. Another point was that the tree should be naturally uniform in its growth and not require much pruning. After several days of search he came across the tree which filled exactly the requirements that I had asked for; he purchased all the cions he could obtain, and sent them to me, and I now have a King orchard producing the finest apples on my place. We have not yet learned the most important lessons that will bring the highest value in horticulture because we have not begun at the foundation to study trees from the standpoint of quality, and propagate from such as will withstand climate, and other conditions. We need to adopt the more progressive methods of study, improvement of soil, improvement of trees and varieties along the entire line of horticultural work.

In regard to orchard methods, let me first take up the planting of the trees, a few words about the handling of the trees when they come from the nursery. We do not take sufficient time to study the foundation of our business; we need to start the orchard right, and there is a great deal in handling the trees properly when we put them out. Now this tree (used for demonstration) has been propagated in the usual manner. I will prune it as it should be for planting.

Upon the manner in which we start a tree is going to depend very largely the results. There is no occasion for planting apple trees and waiting ten, twelve, or fifteen years for them to come into bearing. An orchard that does not begin to bear fruit so that you can begin to make some sale the fifth year I do not consider has been well started. By this method of propagation and pruning which I have outlined I have on my own place an orchard of 1000 trees planted only five years this past spring, producing apples that I have sold in the Boston market for $10 a barrel. Start in with one year old trees and give them good culture in the nursery rows. Transplant once or twice for every time you plant these trees in the nursery row you are forcing them on to bearing. In regard to pruning, cut the roots back one-third, don't cut everything off as in the Stringfellow method, which may do for the South but not here. Cutting back all of these roots; aim to cut in such a way that when the roots are set the cut portion will rest upon the ground because there we want the new roots to come out as quickly as possible after the tree is transplanted. I have taken out practically one-third of the roots. From the end of each of these pruned roots, if you will dig down four or five months after, you will find a mass of fine roots that have pushed out from the ends that I have cut. If these are not cut the tree has to labor to force out roots from these points.

Now in pruning back the tops there is a difference of opinion, some nursery men say, "Don't prune at all the first year; you want

all the foliage on the tree in order to stimulate the growth of the roots." I believe it is better to prune the trees closely when you set them out, and from yearling trees I take everything off, and prune to a straight stalk. Here is a tree three years old; I would not prune a three year old tree as much as that; I would leave on these lower branches. Avoid always the possibility of a crotch; this tree is badly formed in this respect; when it gets to bearing fruit you will have a split tree; there is a crotch at this point and you will have in the future a ruined tree because the weight going in both directions cannot but split the tree through the center. Take this center piece out because it is important to get rid of this crotch. These side branches need to come off and the wounds painted because you want to leave no opportunity for bacterial development.

QUESTION: Would it not be better to have more low branches?

MR. POWELL: I believe in the low-headed tree; that tree is cut down nearly right; that would be about two and a quarter feet. I like trees two and a half feet from the ground from which to have the head. We want to avoid having our trees grow up too high. Let the pruning always be done around the top; keep the top cut off and let your trees spread in all directions so as to get the most open form you can; start your trees pretty well down and let these branches spread until they begin to bear fruit.

QUESTION: What about cultivating up to the tree?

MR. POWELL: I like clean cultivation and I am asking manufacturers to give us different kinds of tools to cultivate low-headed orchards. What we want is a tool with a system of gang plows, two or possibly three gang plows put out on the end of a shaft that will run close up to the trees, stir the ground, but not plow furrows, only cut the soil; the horses should work in the middle of the rows, the gang plows running back under the trees. I believe this can be done with bars on heads so adjusted that these small plows may be pulled along under the branches so that you need not crowd the horses up under the trees, and the same plan could be followed in harrowing.

QUESTION: Would you leave only one bud and rub the rest all off?

MR. POWELL: No. In the budding of the yearling tree I would put the buds just where I wanted the head. You can take off all of these branches and put the buds here, and so you can go right on up about eight or twelve inches and get the top exactly as you want it and have only one form of tree to deal with.

QUESTION: Suppose you are not building; would you leave more than one bud toward the terminal and rub the rest off?

MR. POWELL: No, I would leave all buds on this tree (illustrating) for at least two years and afterwards trim and make a head just where you want it.

QUESTION: Would you discriminate according to varieties? Would you trim or head a standard tree as you would a tree of early bearing tendency?

MR. POWELL: Yes, I would apply the same principle to practically all varieties. Of course you would not prune as much on the Wealthy as on the Baldwins or on trees that grow wood more abundantly than others.

In relation to the system of planting; I am pursuing an entirely different plan and I think the newer method of interplanting would be of value to you, but on this point I want it to be very clearly understood that when I recommend interplanting it is only for those who have good stiff backbones. I am planting 110 trees to the acre; 40 feet apart for the permanent trees and interplanting 20 feet each way with what is known as fillers. I believe that all our methods should be much more intensive than we have thought of before. In the very extensive planting of trees in Washington, Oregon, Idaho and other Western States, we have got a big proposition to meet in competition. The best buyers don't want to touch Eastern grown fruit, that is, as soon as they can get enough Western fruit they won't touch our apples. We talk to the buyers in New York City about our Spitzenburgs and they will not consider them.

They say that we cannot grow good Spitzenburgs in the East, and it is simply because the Western growers put up their fruit in such an excellent manner. We have strong competition before us, we must use the most intensive methods in apple culture, and so I plant closely. The first thing to be done is the improvement of the soil; make it highly productive so that it can carry the system which I advise. For the permanent trees I use Northern Spys, Spitzenburgs and other high grade varieties. The aim is not to grow big apples; the buyers in New York City discount the big apples. When carloads are bought at the West they specify that they can put in only about 20% of big apples. The best trade don't want these great overgrown apples. Now I would use the Rhode Island Greening and the Northern Spy. This (showing sample) is just a little too big for a typical Rhode Island Greening, but this is one of the old standard varieties that in the future is going to have as high a value as a King or Spitzenburg or any other apple. In New York City they are paying $6.00 a box which is $18 a barrel for Rhode Island Greenings and these prices are paid by New England people who prize the Greening. They have sold in barrels above everything else, outside of the McIntosh Red, at least half a dollar higher. Then I would use for one of the permanent trees that exceedingly choice apple, the McIntosh, and I would not object at all to planting it as a filler because of its high value, but when you plant these varieties as fillers you have got to have the nerve to take them out when it is necessary or you will ruin the whole orchard enterprise. You must pull out two-thirds of the trees. The

Rhode Island Greening and the King would be good for permanent trees.

A MEMBER: In this vicinity the Rhode Island Greening will not grow within a hundred miles, and the same with the Baldwins.

Mr. Powell: Choose those varieties then that do thrive here. If those are the Snow or McIntosh or Northern Spy, use any of them as permanent trees. For interplanting use Duchess of Oldenburg, which is one of the best export apples.

QUESTION: What about Wealthy?

MR. POWELL: It is hardy and will stand your climate all right. Use it both as filler and permanent trees.

QUESTION: The Duchess is not too early then?

MR. POWELL: No, it brings high prices in Europe and they want our apples as soon as they can get them after July.

QUESTION: What about the Alexander?

MR. POWELL: The Alexander is a high-priced apple and hardy, it is of poor quality, but will do for a filler because it is an early bearer and is a good cooking apple.

QUESTION: What about Wolf River?

MR. POWELL: It is also good. You want to cover all the seasons of the year, starting in with the Red Astrachan and Williams Early. The Yellow Transparent is good but is a hard apple to ship, delicate skin and light in color, but the question of varieties I think you can settle for yourselves. Choose those varieties that do best in your section.

On the question of pruning, when you come to these low-headed trees with the filler system, the method of pruning must be different. Cut off all the top so as to keep the trees down low and yet not spread out so as to encroach upon the smaller trees. If you prune low, always cut to a bud that is on the upper side; you will then throw the tendency of the lower branches upward in growth.

I am working along the line of the culture of dwarf apple trees but I think that comes within the realm of the specialist. I am also treating my standard trees on the same principle that I am using with the dwarf trees. The principle is this: summer pruning to dwarf standard trees; prune in June so as to check this tendency to an overgrown tree. If you start right you need not do so much pruning. Prune the lower branches to throw the growth upwards instead of straight out to take up room from this narrow space until the trees have gotten to be six or seven years old.

In regard to the filler trees I believe it is possible to begin bearing at five years and continue up to eighteen or twenty years by this system of pruning back. This is an entirely new proposition, and I would advise to take one acre and start on this plan and when you can master one, then take five, and if you can master five take ten, then proceed along on this line and you do not

know the limit to the possibilities that you can bring to your Vermont farms.

I understand that Mr. Holmes has been offered $50,000 for his 100 acre orchard. Of course he could not afford to sell his orchard for anything like that; his orchard is worth every dollar as much as the best orchard in Oregon, and some of them are selling for $1,000 and more an acre, and your orchards, if handled along the lines that I have advised, will add greatly to the value of the land on which they are planted.

QUESTION: Do you know of anything that adds to the value of land more than to plant apple trees on it?

MR. POWELL: No, I don't believe there is any use to which the land may be put that will make so large a return, and the investment is permanent. Peach trees soon go out and if you plant pear trees they will be more uncertain.

QUESTION: What about planting the rough lands?

MR. POWELL: I would not advocate that very much for the reason that you have here in New England two pests which are formidable in the brown tailed and gypsy moths. Unless you can handle spraying machinery your old trees are going to become extinct in a few years just as the orchards on Long Island have gone through injury by San Jose scale. The old orchards are practically gone because they were high trees and the spraying facilities have not been equal to reaching these high trees. I think 99 percent of all the old orchards in Long Island have been destroyed. Don't plant your rough lands; plant only land that you can go onto with spraying machinery and if you plant trees of this low-head character you can control the scale, and the brown tailed and gypsy moths.

QUESTION: Would it pay to spray by hand?

MR. POWELL: You would have to be limited to small orchards for you cannot go over large territories by hand. You could plant five and ten acre orchards and then combine. Let your Horticultural Society of Vermont develop community planting, and co-operation. Take thirty or forty land owners and let them plant five or ten acre orchards each. You could do it here or in other parts of Vermont. Just grow small orchards and take care of them in the best possible manner.

QUESTION: It would be better to have one man do the work and do it well?

MR. POWELL: Yes, if there were twenty-five or thirty land owners, through co-operation; spraying, grading and packing could be much better done.

Messrs Steinhart & Kelly, extensive buyers of New York City, have just returned from Oregon and gave $2.50 per box for apples there, which is an enormous price. They went to the apple growers at Hood River and said, "We are ready to make a contract with you, we will take all the No. 1 apples you have in boxes, but every one must be perfect, there must not be a blemish on them." They could

not have done that if there had not been an organization and a central point where the apples could be packed. It is because there is an organization which decides what apples are good enough to ship that they are graded so closely, and well, and command high value.

Skilled packers and buyers will come here as quickly as they will go to Oregon or Florida. Try to get these local organizations and get your fruit growers to working together on the small orchards and you can defy the Western orchardists and any competition.

QUESTION: What is going to be the end of the San Jose scale?

MR. POWELL: It will run out the careless man, and the man who does not spray will be without orchards and apples. Like the poor, it will always be present, it will put out of business all who will not care for their trees.

This is the work (sample shown) of the apple aphis; there never has been such an increase of this pest in the history of apple growing, as the past season and it has cut down the fruit about 50 percent. The aphis came on when the fruit was just forming and the attack was so severe that the leaves just rolled up, and we had all these masses of little apples as the result of the unusual attack in July. It may not happen again in many years.

QUESTION: The insect itself, what is it?

MR. POWELL: It is simply a louse, a sucking class of insects. It is not like the codling moth, but it deposits its eggs near the buds and when they hatch the insect lives on the leaves and young growth. They hatch directly from the bodies of the females, and there are several generations in a season.

QUESTION: Then spraying will destroy it?

MR. POWELL: The oil sprays are good, and by spraying thoroughly with these materials and promptly, you will destroy this pest, and prevent much injury.

QUESTION: What about the railroad worm?

MR. POWELL: You cannot treat it for the reason that the eggs are laid under the skin of the apple. The only thing to do is whenever an apple falls to the ground to pick it up and destroy it. If your orchard is infested it is better to destroy the entire crop of apples one year, rather than let them remain and come out again next year.

QUESTION: Better turn the hogs in and let them clean for you?

MR. POWELL: Yes, or sheep are good. Shake the fruit all off, if it is generally infested, and destroy it for one year.

QUESTION: Suppose your neighbor doesn't do it?

MR. POWELL: Then he will have to suffer; they don't migrate very far.

QUESTION: Will late plowing help?

MR. POWELL: Yes, it is well if you can turn up the soil late in the autumn and throw the pupae up; again fall ploughing will kill other pupae.

QUESTION: Would I plow deep or shallow?

MR. POWELL: I would rather plow shallow and turn them up, because if you plow deep you may injure the trees, and you may turn the pupae down deep and thus not eradicate it.

QUESTION: Would there be danger from the apples that remain on the tree if those that fall to the ground are cleaned up as fast as they fall?

MR. POWELL: In a badly infested orchard I would take out all the apples.

QUESTION: In your climate do you plow your clover in the spring?

MR. POWELL: Yes, I wait until spring, as a winter covering is desirable.

MY EXPERIENCE WITH A PRODUCTIVE AND UNPRODUCTIVE ORCHARD.

C. T. HOLMES, CHARLOTTE, VERMONT.

I was interested in this orchard before 1907, but not in such a way that I could give it the kind of care I knew it should have. The hundred acres had been in sod for years. The trees had been trimmed and sprayed thoroughly for several years, but the yield had never been up to the average of orchards in this section, although since spraying began, the quality had been good.

In the winter of 1907, 50 acres of greenings were given a good mulch of barnyard manure as far as the branches extended. As soon as frost was out of the ground I turned this mulch under about three inches—not deep enough to injure the roots. I don't believe in pruning a tree at both ends. One acre was given a dressing of air slacked lime—about 200 pounds to each tree. I will here say that this acre showed such marked superiority to the rest in color and size of foliage and in finish and texture of fruit that 70 acres more were limed that fall and the remainder of the orchard will be limed this winter.

To go back to 1907, the plowed ground was thoroughly pulverized with a disc harrow and was gone over with a spring tooth harrow about once every two weeks until the middle of July, when I sowed one bushel of buckwheat to the acre. Two weeks before apple picking time, when the buckwheat was in

full bloom, it was rolled with a low roller in order to break it down and at the same time provide a soft cushion for windfalls and keep them clean. That fall I picked 2,500 barrels from the 50 acres I took care of, and 600 barrels from the rest.

In the spring of 1908, foolishly allowing myself to be influenced against my own judgment by the opinions of some of the wise ones, who said the crop of the previous year was due to manure alone, I dropped one-half of the 50 acres and cultivated but 25, while manuring the entire orchard. We all know what a dry season we had in 1908. I cultivated the 25 acres once every ten days until the middle of July when I seeded to mammoth clover for a cover crop for winter. The outcome of this experiment was, that from 25 acres cultivated two years in succession 600 barrels were picked. The 25 acres cultivated but one year yielded 200 barrels, much inferior in size; and from the other half of the entire orchard, I got nothing.

I was now convinced that intensive cultivation was of the greatest importance, and this year the whole orchard was under cultivation. From inquiries coming from all parts of the continent, it would seem that every one had heard of the crop of apples which rewarded me in 1909.

Of 4,000 barrels, I picked 3,100 from the 50 acres cultivated two and three years and of these I didn't have ten barrels of stung apples. The crop was packed as fancies, firsts and seconds.

2,200 barrels fancies—nothing smaller than two and three-fourths inches.
800 barrels firsts—nothing smaller than two and one-fourth inches.
Balance, windfalls, a trifle small, but free from worms.

The windfalls brought \$2.00 per barrel at the station. The others were placed in cold storage at Troy, N. Y., and are being handled by E. P. Loomis & Co., of New York. Fancies are selling today at \$7.00 and firsts at \$5.00. Number twos were sold on arrival at \$3.00.

The 1907 crop netted, after deducting costs of picking, freight and commission	\$ 3,044.50
The crop of 1908 netted	2,000.00
This year the net returns will go well beyond	\$10,000.00

In spraying I use a two and one-third horsepower gasoline sprayer made by the Field Force Pump Co., Elmira, N. Y. A man makes no mistake when he buys one of these. Hand power pumps are too laborious and do not give force enough to produce the fine spray necessary to reach every part of fruit and foliage.

I spray before buds open for bud moth and cigar case bearer with bordeaux-lead-arsenate mixture, and again, after the blossoms fall, for codling moth, with lead arsenate and lime. My experience

is that this is the most important spray. The third spray comes just before the apple turns down, and is for blight, fungus and the codling moth. Spraying at this time, if carefully done, fills the calyx with a first and last breakfast for the grub when he emerges from the egg. Our greatest pest is the codling moth, but this little chap need not be feared if the spray nozzle is pointed in the right direction and held there long enough during the second spraying.

With good cultivation, thorough spraying, trimming and fertilization, we have nothing to fear from the Great Northwest.

Last but not least, pack true to mark.

"GOOD OLD VERMONT."

W. N. PHELPS, So. HERO, VT.

Air, "A Little More Cider."

I.

There is a State called "Old Vermont"
  Where all is bright and fair,
And those who dwell within its bounds,
  A reputation bear
For honor, truth and much that's good,
  Wherever you may go.
No place so dear, no friends so true,
  As those we used to know.

(CHORUS FOR FIRST TWO VERSES.)

Oh! we love our native State,
  It seems the best on earth,
For here we've dwelt so long, my boys,
  E'en since our early birth.

II.

The fruit that grows in "Old Vermont"
  Is sweeter than the best
That ever grew in any State
  In North, South, East or West.
I would not live away from here,
  For any length of time,
For I am happy in Vermont
  Among the friends of mine.

(CHORUS.)

III.

Her valleys are so dear to me,
  Her mountains, too, I love,
Her many lakes and rivers, too,
  That flow down from above.
Among the hills that we love best
  In our Green Mountain State
Are fine young men and pretty girls
  As ever you have met.

(CHORUS FOR LAST THREE VERSES.)

Oh! we love our dear old State,
  Our hearts with joy it fills,
We'll end our days in "Old Vermont"
  And sleep beneath her hills.

IV.

The noblest men and horses fine,
  In such we do abound;
Our churches, too, and schools are grand
  As any I have found.
Let others praise their Switzerland
  Its scenery so fine,
I love the best the sights I find
  In this Vermont of mine.

(CHORUS.)

V.

There is no State except Vermont
  That has such fine wool sheep,
As those that graze within our fields
  Upon the hillsides steep.
This State is noted, too, they say,
  And this is very true,
For handsome women in some way
  As any you ever knew.

(CHORUS.)

SOME EFFECTS OF CION AND STOCK.

PROFESSOR A. G. GULLEY, STORRS, CONN.

There is a general belief that our common varieties of apples vary much in sections and in individual trees, and when a tree is found that is bearing especially fine fruit or in any way changed from what is considered as normal, there is at once a demand for cions to use on other trees. About all qualities are supposed to be affected and readily transferred, and if statements made are to be believed, it is a very simple matter to widely change the character of our standard fruits.

Notwithstanding all that, when the nurseryman or fruit grower needs more of a variety, he goes to the orchard or nursery and cuts cions and propagates new lots with implicit confidence that the new trees will produce fruit like the present tree. In the case of some kinds, this has gone for several generations without disappointment as to result. However, there must be some foundation for this belief, and the question arises, are the changes supposed to be taking place, imaginary or real, and if real, are they temporary or permanent? Without doubt many are imaginary, and arise from personal interest in the tree affected. Especially is this true as to the idea that varieties of today are not equal to those of days gone by, or in the case of wonderfully fine peaches that we hear were grown years ago, or of the particularly sweet or luscious apples of which memory is the only record, but well known, however, in boyhood days. These are varieties that are known to have changed or run out, although admittedly the same varieties often exist. The speaker has one case of exactly this type. The change is in the individual, not in the fruit. That varieties do exist in individuals of a variety is easily proven by any one in orchard work by watching the same trees for a series of years. How, then, may we account for the permanence of varieties? May it not be that most of these variations are only temporary or belonging to the individual and cannot be transferred to another?

It may be asked why horticulturists have not done more to prove the truth or falsehood of these propositions or show definitely the changes we may expect. Probably, first, because many are not worth proving, and second, to establish almost any point requires a long time, and experimenters in the past, at least, have not been willing to take up a course of experiments that requires several years to get even the beginning of a result.

However, having been handling varieties for many years and been investigating them more closely in recent ones, I concluded to test some of the ideas advanced and wait and hope for results.

The effect of stock upon cion is often referred to, and the variations produced are seemingly endless that are reported to have been effected by one on the other; season, shape, color, taste, growth, and indeed, about every quality possessed by true fruit is changed in this way. Yet, as already stated, trees are planted each year, propagated by the usual methods and we expect results of a definite character and are not disappointed.

The question of affecting quality was important and the first one naturally noticed, and to this end I began work. Having at hand trees grown from root grafts of two varieties of a very different nature, Sweet Bough, the well-known, large, yellow, summer sweet apple, and Jersey Black, a very late, small, dark red, sour apple of fair quality, I used these for stocks. Upon them I worked varieties also very different: first, Red Canada. This was chosen because there are many published statements as to its variability under different circumstances and on different stocks: second, Red Astrachan. This was taken for its almost opposite qualities to the first and on account of its early bearing habits, hoping for quicker results. After a wait of about four years on the Red Astrachan and six on the Red Canada, I obtained results, or rather, apples.

The Red Astrachan might reasonably be expected to be changed in two different ways,—less acid on the sweet stocks, or later on the late stocks, with a possibility that size, shape or color could be changed on either. After watchig the fruit several seasons, there is no result. Many trials by several have not shown a variation that is perceptible. As to the Red Canada, the results are the same. I have fruit here from the Sweet Bough stock and also from the Northern Spy and others; you can note the difference, if any.

I have just obtained results the past season in another case, which is presented for your testing. The Bosc pear is a very poor grower, but fine in quality; the Kieffer exactly the opposite. Why not grow the former on the latter? I put this question at the meeting referred to and at once had the statement made to me as refuting my argument that stock does not affect quality, that it spoiled Bosc entirely in this way. Well, I had Kieffer stocks and Bosc cions; I set the students grafting. They have been at it for four years. This year I had fruit from Kieffer stock and also from ordinary stock. You may test for yourselves and decide from flowers which are grown on Kieffer stock. When I spoke of this at Boston to a well-known pear grower, I was surprised to hear him state, "I do not think it would affect the quality, but I cannot make it grow on that stock." With us it grows particularly strong after one year.

I may cite another instance of a different nature. Our students nearly every year produce that horticultural freak of growing the tomato on potato roots. I have yet to detect any effect whatever upon the fruit. We went so far on one occasion as to grow plants from seed of the product alongside the original variety, but could detect no difference.

If varieties could be easily affected by the stock it occurred to me that our common practice of using the Northern Spy stock, a noted slow bearer, would have some effect upon the top by causing it to be longer coming into bearing. I have, with others, used this stock for years, but this question did not occur to me until I was investigating others. This previous use enabled me to get answers soon to the question. In an orchard planted in 1900 we had three rows of Northern Spys put in for this purpose. A year or two later one row each was grafted to Red Canada, Jonathan and Esopus. Of the Jonathan over half produced fruit the third season and all of them the next or about as soon as there was bearing wood. The Red Canada did not bear an apple till 1909, and the past season bore the first full crop. Just what I should have looked for on any stock as it never bears early in any case, while the Jonathan always bears young. The Esopus began to produce fruit almost precisely with trees in our trial orchard on other stocks. In all of these cases stocks evidently had nothing to do with time of bearing. I have Sutton on my farm in a similar test upon another point, but not yet fruited.

To go back a little, if varieties are easily changed from any course, then of necessity, through several repetitions of propagation, we should expect to find ourselves far from the original kind unless the improbable event of their changes, balancing themselves, occurred. I think Professor Bailey said a century would do this.

Now if we could get the original, or near it, and the recent forms of one of our long-established varieties alongside, we could note the changes that have taken place. The Baldwins, being well known, would have been the ideal variety for a trial of this sort. But the original Baldwin has been dead several years. However, I live only about 40 miles from where the reputed original Rhode Island Greening stood, till four years ago a variety as widespread and well known as the Baldwin. This tree had a written record of having borne fruit over 170 years and is supposed to have reached an age of nearly 200 years. The owner willingly furnished a few small growths when I asked for them, stating my object. Their appearance fully bore out the statement as to the age of the tree. For stocks I used two roots grafted,—Wealthy trees six years in orchard. For the modern Greening I used cions from New York grown trees. I have no doubt they had passed through at least 20 propagations since leaving the original. I have waited over six years for first fruit, the modern Greening being more rapid and bearing two years earlier. I present the only specimens of the old stock, also some

of the modern. As to the growth of these trees there is no evident difference. I have also seen another specimen from another tree once removed of about the same character. The owner stated that he could note no difference except that the old Greening sometimes had more yellow color. A prediction made at Rochester before the tree had fruited that we should have only Greenings from either tree seems to have been verified. What does all this show? In all these two centuries of transfer of growth of the Greening under various conditions the variety has not perceptibly changed or run out.

I may add that I began last year to put the King through the same test.

We have been top working trees for years with the idea that hardiness has been gained by the use of hardy stocks, as Northern Spy or Tolman Sweet. A principle that has not been questioned in long practice. Yet the first test of the matter by a Canadian experiment station, by growing both hardy and tender varieties on the same stock and trees, resulted in the killing of the tender part of each tree the first cold winter, while the hardy variety escaped. Perhaps we are all off on this point too. We cannot try this with us as all kinds are hardy.

Strong growing stocks without doubt transmit the character to the top. It is simply a case of plenty of food. But there is no evidence that the top is permanently affected. In case of Bosc and Kieffer this effect is very marked, as it is where any weak grower is placed on a strong growing stock. But it cannot be transferred again. We have abundance of evidence of dwarfing by stocks. Lack of food, being the first course, but there is reason to think that other influences have a part in the effect, as is distinctly shown in deep planted dwarf trees rooting above the stock, but which never again grows as free as before, but here again the influence goes no further as cions from this dwarf tree grow as freely as ever on any free stock. I do not doubt that disease can be transmitted, but have never proved it.

To sum up, most of the variations noted are not permanent, but are due to special influence of the location and for which cross fertilization might often account, but which the variety would lose when transferred to another location.

Of the effect of the cion upon the stock very few concern themselves. For from a practical standpoint it is not very important. But in many cases is quite as strong and evident. Any nursery boy will tell you that some varieties of budded or root grafted trees always dig harder than others. Some of our students noted it at this first trial of digging trees a few days ago with McIntosh, Baldwin and Rhode Island Greenings in rows side by side, and trees same age and size. The first had much the strongest roots and rooted deeper, while the latter lifted without much trouble. Had there been a row of Tolmans alongside it would have dug easier yet. Disease is easily transmitted to

stocks from the cion as proven in work on peaches with yellows. In a very few instances peculiar leaves of the cion have been noted as appearing near and below the union. This is very rare and probably not at all permanent. As a whole most of the changes in this direction are interesting, but need not be considered in general orchard work.

FRUIT AS FOOD.

PROFESSOR BERTHA M. TERRILL, UNIVERSITY OF VERMONT, BURLINGTON, VERMONT.

As I travelled through Washington and Oregon six years ago, seeing the splendid fruit orchards, the bewilderingly rich display of local fruit at the Portland Exposition, and as I heard of the remarkable profits realized from them, it was with regret that I reflected upon the less favorable conditions in New England for similar possibilities. I was partially comforted in Chicago two years ago where I searched in vain for what I considered a good, edible apple. Appealing finally to one grocer, I tried to describe what I desired. He asked me where I found such. When I told him, he replied, "Ah, if you are from Vermont we cannot hope to satisfy you. We have nothing to compare with Vermont apples." If our varieties of native fruits are limited they are good and supplemented by the many imported varieties which are now successfully handled in shipping and with the increasing use of fruits we may well consider what their value is in our diet.

Fruit has been held in high regard and used as food by man through the ages. An old Scandinavian legend, even, affirms that the apple was early distinguished as the favorite food of the gods, who always ate it whenever they found themselves growing infirm of either body or mind. When we consider that the apple which was thus remarkably honored could not have been a better variety than the small crab, it seems the more appropriate to respect our present apple with its beautiful coloring, juicy texture and delicious flavor.

The early Greeks recognized it as an evidence of divine helpfulness that Bacchus had taught men to cultivate the vine. We, too, rejoice in the fruit of the vineyard even if men have too often perverted "divine helpfulness" to Satanic undoing.

Of all the varied sources from which we draw for our food supply, nothing presents a more general appeal and gives more

pleasure than the different varieties of fruit available at different seasons.

What is the charm? What claim has fruit to be classed as a food? To what extent should it find a place in the diet? It is helpful in realizing the value of many articles of food to consider their primary purpose. The grains, rich in starch, are a store house of food for the seedling, of a nature not easily destroyed.

An egg, primarily an undeveloped chick, has, perforce, a large store of building material for growth in the nature of proteid and mineral matter, also a supply of concentrated heat-producing food in the fat. Since little energy is needed until the chick is hatched, we are left to supply that in the corn meal later.

If we follow the same study, applying it to fruits, we find one and the same purpose dominant in all fruit-bearing plants,—the growth of something to attract birds and insects that the seed inclosed in them may be scattered. This, then, accounts for the attractiveness of color, variety of form and appearance and the pleasing flavors which characterize all fruits.

For us, too, the primary appeal in fruit is rather an aesthetic one than the nourishment afforded. It is a pleasure to the eye, a gratification to the palate. This is effected by the particular chemical compounds which produce the coloring matters and to the particular odor and flavor which characterize the different varieties, due to small quantities of etherial bodies. These have not been very successfully analyzed, yet have been so skillfully imitated and used in the manufacture of artificial extracts of less healthful nature, as to baffle amateurs.

While these bodies have no nutritive value, the pleasing odors and flavors which they produce serve a great purpose in stimulating appetite and aiding digestion. The nervous system bears a very close connection with the digestive. A thing which appeals through the sense of sight often plays a great part in stimulating secretions for digestion. We have but to think of an attractive, juicy orange, for instance, to have the "mouth water" with a generous secretion of saliva. The same results occur through stimulating the sense of taste. From this point of view, then, fruits play a worthy role among our foods, and are an important part of our food supply. We have passed the time when the small boy's definition of hygienic food holds good: "It's food that's good for you, but han't got no taste to it." We now know from very definite experiments that it makes a vast difference with the digestion and assimilation of our food whether it is pleasing, appetizing or not, and anything like fruit which contributes in so many and such delicious ways to the pleasure we take in our food must have its place in the diet justified by this single merit.

Let us next consider to what extent fruit may be drawn upon to furnish actual nutrients. We measure the relative value of any food

by determining the proportion of the different food constituents which it contains. Proteid or nitrogenous compound, fats and carbohydrates, together with the amount of water and ash or mineral content.

From the analyses of fruits we find that the proteid and fat content in practically all varieties is too low to be an appreciable factor. The carbohydrates, on the other hand, are present in larger amounts and in some varieties to so great an extent as to make them a very valuable food. Their value is also enhanced by the fact that the carbohydrates present are, for the most part, very favorable forms—sugars and the pectin bodies utilized in making jellies. There are three principal sugars in fruit, cane sugar, grape sugar or glucose, and fruit sugar or levulose. Since the last two are forms of invert sugar, very readily assimilated, we may expect to find, as is true, that what nutrients of this nature are found in any variety of fruit are readily available as food.

The great variation in the amount of nutrients present in fruits makes it necessary to discriminate carefully and for convenience the varieties are often divided into flavor-fruits and food-fruits.

In the first of these, the flavor-fruits, are classed the dilute forms, with 80 percent or over of water, among which we find such typical examples as the apple, orange and strawberry. These, apart from the pleasure they afford and the stimulus they give to digestion, are useful for the mineral salts they contain, the cellulose they contribute and the pectin bodies utilized extensively in jelly making, all of which will be spoken of later.

In contrast to these flavor-fruits stands the banana as an example of a food-fruit with a carbohydrate value of 21 percent, which exceeds that of the potato, while dried fruits are without question to be included in this class, as dates contain 66 percent carbohydrates, prunes about the same, figs 63 percent, while raisins rise to 76 percent and stand almost at the head of the list of concentrated foods. It is calculated that one-half pound of dates and a glass of milk gives sufficient and satisfying food for a meal for one engaged in sedentary occupations, while figs contain more nourishment than bread, six ounces and one pint of milk affording a good meal. Our own use of many of these imported fruits is most erroneous. Probably the indigestibility attributed to them often is the result of our failure to recognize them as a staple article of diet instead of a sweetmeat with which to end a hearty meal or to indulge in as a between-meal dainty.

The chief nutritive value in fruits is, then, that afforded by the carbohydrate group and this largely in the form of sugars—starch appears often in unripe fruits and disappears as the fruit ripens. Even bananas, which are usually spoken of as a starchy food, if fully ripened until dark and soft (the only proper condition

in which to eat them), show to a very marked degree the change of starch to sugar.

We see, then, a striking difference between the carbohydrates contributed in fruits in some form of sugar and the form contained in vegetables, which is starch. The desirability of the one form or the other is a debated question with many. It is probably nearest the truth to say that the system is best that is most normally nourished by a supply of carbohydrates from both sources, as occurs in a mixed diet. While sugar and starch are alike in the elements which they contain and so similar in composition that starch can be readily converted into forms of sugar, while both eventually perform the same function in the body: namely, produce energy; yet there is a marked difference in the readiness with which they are digested and assimilated and, therefore, in their "staying" qualities and the tax upon the system. For a quick, easily digested food sugar excels. Starch is slower and passes through more changes before it is finally reduced to a soluble form which the body can utilize. This, in some cases, would certainly be an argument in favor of sugar. At least two arguments in favor of not relying upon it exclusively may be presented, however. Our systems are clearly adapted for the digestion of starch in food since at least one ferment, the ptyalin in saliva, has for its sole work the inversion of starch. If it was not a wholesome food, as some urge, this provision would hardly have been made. Again, our systems demand for their complete satisfaction in food a portion which will "stand by." Workmen at continuous muscular labor, for instance, find it especially true that a food like baked beans, from which the nutrients are slowly extracted and digested, is more satisfying than one from which the same amount is easily derived, as in concentrated sweets.

These seem to be forceful arguments against a diet in which the carbohydrates are drawn exclusively from fruits as in the nut and fruit diet of the Natural Food theorists. I have spoken of this the more at length because of the danger in which we stand from such unscientific, wholly misleading statements as are found in the official statement of the principles of the Natural Food Society: for instance, let me quote: "These cereals and vegetables are unnatural and disease-producing foods, and the chief cause of nervous prostration and broken-down health," a diet containing starchy foods "ruins the blood vessels, irritates and inflames the system, and makes men prematurely old."

The absolute inconsistency of their position is exemplified in the single instance of their use of banana meal and chestnut flour in their recipes which, from a non-starch standpoint, are surely as unwholesome as wheat flour.

The value of fruits as important contributors of mineral matter, deserves especial emphasis. It has long been realized that it was essential to supply the necessary amount of minerals for tissue-building, but further recent investigations point to other

important reasons for providing generously for these in our food as their presence seems to have decided influence upon the proper digestion and assimilation of all food, since our richest supply of mineral matter comes from green vegetables and fruits, we have need to include a generous amount. Scurvy and other skin diseases are directly traceable to a too limited supply. Before the process of canning both vegetables and fruits was developed to its present measure of success, the difficulty of long voyages without these foods was not inconsiderable. As in all green food products, cellulose plays a conspicuous part in fruits. The amount varies greatly in different varieties and under different conditions of cultivation and ripeness,—the native, uncultivated varieties having a much larger percent. A considerable amount disappears also as fruits ripen, which accounts in large measure, no doubt, for the greater digestibility of ripe fruit. What remains "mellow" and breaks down more readily. Although a practically indigestible and "waste" carbohydrate so far as its own food value is concerned, the amount of cellulose furnished in our food is full of significance. For the proper and complete absorption of food the walls of the alimentary canal need extension, which a residue of waste or refuse in our food provides for. Cellulose forms a valuable source of ballast of this kind. Sluggish action also along the digestive tract is attended with many harmful results to health. Cellulose as an irritant, quickens peristaltic action and aids by freeing the system more readily of waste which, if retained, is detrimental. It sometimes happens, to be sure, that the large amount of hard cellular tissue in unripe fruit, together with the larger amount of acids and imperfect mastication, may by their excess produce undue disturbance. Some most even have trouble with all uncooked fruits, but for people in normal condition fruits, properly ripened, free from bacteria, and with the mild and healthful stimulation of the acids then present, form an exceedingly healthful addition to the diet.

The effects of cooking upon the digestibility of particular fruits, has not been very thoroughly investigated. So far as determined the result is much the same as that from the exposure to the heat of the sun in ripening. It tends to soften the cellulose and convert the membranes into gelatinous forms, while the moisture seems to expand or soften and dissolve the cellulose walls, setting free the nutrients. So far as cooking affects the nutrients themselves the chief result seems to be the change or inversion of whatever cane sugar is present into a more readily digested form. Another small class of carbohydrates found in the fruits are valuable largely for their utility in preserving fruits. These are the pectin bodies, which lie in richest amount near the skin and are found most plentifully in fruit not fully ripe. These are closely related to gum arabic and starch, all of which, when cooked with hot water, give a jelly on cooling.

The housekeeper finds these a most valuable aid in adding variety to the many different methods of utilizing fruits. Some kinds of fruit seem to be much richer in these pectin bodies than others; the pear, for instance, has little or none available, while apples, currants and quince are among those abundantly provided.

The relative cost of fruits as a food is not difficult to estimate when one has a clear understanding of the food value. As a source of proteid they are prohibitively and undesirably expensive; as a source of energy, on the other hand, some varieties, especially the food fruits, are justified when combined in reasonable quantity with proteid foods to furnish a well balanced diet. Fruit at least once a day in some form, dried or fresh, is desirable.

STORAGE OF VEGETABLES.

J. W. WELLINGTON, VERMONT EXPERIMENT STATION.

Storage is not a modern problem, although it is only in recent years that it has assumed a position of such widespread import in both the scientific and practical world. The growing of vegetables was a fine art even in the time of the Egyptians, but we may readily conclude that in a land of perpetual warmth and plenty of sunshine there was little need of endeavoring to keep fruits and vegetables beyond their seasons. From those ancient times until very recently, agriculture and its branches received, as you all know, very little thought; but now in this era of advancement, we must be open to new ideas and methods and endeavor to keep our science abreast and even ahead of the others.

Vegetable storage is essential in Vermont. We have a period of six months in which it is impossible to grow crops under ordinary out-door conditions and these six months are just as important on the living calendar as the other six and perhaps more so, for who is there among us who does not feel the need of a nice dish of hot vegetables during the long, cold months of our northern winter.

The value of vegetables as food is unquestioned. As a factor in the maintenance of health there are none here who will dispute me. It is a natural law of human nutrition that we need more than just animal matter.

But this paper has not been written for the purpose of persuading you to become vegetarians, but to disclose to you some of the possibilities in the home storage of vegetables, leaving entirely

out of the discussion the phase of artificial cold storage. There is much pleasure and profit to be gained and little expense necessary to secure splendid results. With meat and flour at present quotations you must turn to the vegetable for aid, and the vegetable is only waiting to prove itself worthy. With a purpose of helpfulness, rather than of any criticism of present methods, I present this paper to you.

Storage is of course a secondary process. In order to store it is essential to have the product. This problem of growing the vegetables cannot be dealt with here.

What do we understand by the word storage? It has, of course, a broad and widespread interpretation, but when confined to perishable products, as fruit and vegetables, we may define storage as the preservation of materials in their natural state, with or without an effort to prolong this natural period. We shall discuss means of lengthening the keeping period by careful and special methods of management.

There are certain clearly defined principles which apply to successful storage—namely, those pertaining to management, temperature, moisture, light and ventilation. These same principles vary according to the specific vegetable at hand. For example, the potato requires a moist, cool atmosphere, while the squash demands a dry, moderately warm location in order to obtain the best result.

The condition of the vegetable at the time of storing is of prime importance. We cannot expect good results from poor material. For example, a squash, in order to be suitable for storage, should be ripe, well hardened and free from mechanical or disease injury. Professor Stuart, in his report on Hubbard Squash in Storage, published in the Twentieth Report of our Station, makes a very strong point of this absence of injury. Vegetables should be dry, free from injury and disease and well matured, and this implies care in handling while storing; unnecessary roughness should be avoided, remembering always that each injured spot allows a loophole through which some insidious fungus is only too willing to enter.

In artificial storage the regulation of the temperature is a purely mechanical process, certain degrees may be demanded and maintained, but in ordinary storage we have to make the best of ordinary conditions. In general we can state that the degree of temperature must not fall below 32 degrees F. A range between 35 degrees and 45 degrees might be considered ideal. In the early fall the practice of opening the ventilators or windows during the night and closing again during the warm days, will do much in maintaining a fairly low degree of temperature.

Moisture is an important factor in the storage of any product. Some crops, roots, potatoes, celery, etc., must be stored in a moist situation, not damp enough, however, to encourage decay. Other vegetables, as onions, squash, etc., require a dry atmosphere.

Hence it is plainly evident that no absolute regulations can be laid down in regard to moisture conditions, but rather that the person desiring to store vegetables shall have an accurate conception of the peculiar requirements of each of the different varieties of vegetables in question.

Ventilation is essential to the maintenance of temperature and moisture at their proper degrees, and no cellar should be without means of changing the air, whether the means be pipes, window or actual ventilator. Fresh air is, certainly, from the point of health alone, a more desirable medium of storage than the damp foul air which will naturally accumulate if ventilation is not practiced.

Let us turn to the subject of storage receptacles. The house cellar is undoubtedly the universal means among farmers at present, as it has been for centuries. There are some advantages in this method of storage and some decided disadvantages. The fact that the vegetables are near at hand whenever needed is the greatest benefit gained. This is more than offset by the presence of unpleasant odors and dampness that arise from vegetables, and again the space occupied by the same might in many cases be used to better advantage. The house cellar is not the ideal place for storage of vegetables. Fruit is better adapted to the locality and every grower should erect a separate storage cellar for his roots, etc., in order that his home may be free from anything which will perhaps endanger the health of the occupants.

Now before discussing the storage cellar proper, let us note for a moment some of many contrivances that are used for the preservation of farm products. Cabbages, roots and potatoes are often stored away in pits. This method, though crude, is strongly urged in preference to having the same under the dwelling roof. The pit system of storage is inconvenient in that it is difficult to obtain small quantities of vegetables as they are needed from time to time during the winter months. The operation of uncovering a pit in zero weather is neither advantageous to the vegetables nor to the grower. A pit is easily and simply constructed. It must be located on well drained land, beyond danger of flooding. Dig out a trench four to six feet wide and of necessary length, to the depth of one foot. Line this with leaves or straw and pile in the vegetables, being careful to build the mound in a triangular form, in order to allow the best possible circulation of air. Cover the heap with a foot of straw and if the weather is not severe allow the heap to remain in this condition for several days. Now cover the straw with six inches of loam. Leave means of ventilation either by pulling the straw up through the loam at various points or by setting up tile. The tile method is advocated. This ventilation is absolutely necessary in order to carry off the heat and moisture arising from the fresh vegetables. After the heap has thoroughly cooled the ventilators must be closed or removed. When the severe weather approaches put on another layer of straw and cover

this with a foot of earth. By this method, potatoes, roots, etc., are kept very successfully until late in the spring. The time spent in building this pit would be almost equivalent to that required to build a storage cellar and the latter will last for years, therefore, I do not particularly care to impress upon you the pit method of storage.

There are miscellaneous ways and means of storing vegetables. Some pile them in sheds and cover with straw and, as with parsnips, some are often left right in the garden.

The farm that is large enough to raise the home supply of potatoes is large enough to possess a separate storage cellar. Every farm should have one,—the size varying, of course, directly with the amount of vegetables grown. The erection of such a building is not a matter of great expense. There is no system equally good. We have the great point of health. Let the vegetables have their own house and we our own. The storage cellar can be so located and constructed that it will be almost as convenient to approach in the winter as would be the house cellar. The work of storing will be reduced to a minimum.

The root cellar, separate and distinct, is decidedly more of a commercial asset than the system of house cellar storage. Larger amounts may be stored, management of product made easier and more systematic,—the whole business of storage will assume a business-like and consequently profitable aspect. The farmer will not need to tell the dealer that he has good vegetables, the dealer will see for himself.

The storage cellar should be located near the other farm buildings, Not being an elaborate and expensive edifice it should be hidden behind some larger building. The location should be well drained, either naturally or artificially, to insure safety from excessive moisture. A situation somewhat protected from the severest winds is desirable. In planning such a cellar, it is better to build one a little beyond present needs, with the purpose in mind of increasing the crops to the size of the building.

The term root cellar is somewhat deceptive and may lend the idea that the structure is wholly underground, which is in this case wrong; the term half-cellar being more correct. A brief description of such a house can be given here. An excavation is made, depth 3 to 4 feet and size according to that of desired structure. The bottom of the cellar is now prepared by leveling the bottom of the excavation. The wall of the house should be at least one foot thick, a grout mixture of field stone and cement being very desirable. The walls at the end should be built so as to support the roof, leaving spaces for a door at one end and a window in the other.

A double roof, covered with the tarred paper is very good, although a single one covered with loam is efficient and cheaper in the start. By all means have a double roof and avoid paying for new boards every year. The door and window must be double

and tightly fitted. The entrance should be on an incline so that a wheelbarrow can be employed in carrying vegetables in and out. The ventilator must be such that it can be opened and closed at convenience. By banking up the house on the approach of severe weather, our cellar will offer satisfactory protection against all weather.

The cost of such a storage cellar would be mostly that of labor, and by doing the work at certain periods of the year the total cost may be kept very low.

The interior of the house may be best utilized by dividing into two long bins, with an aisle between.

The profit that will result from such a cellar is worthy of consideration. First class vegetables almost always sell to better advantage in the spring than at the time of harvesting, and every farmer ought to raise enough to have some for sale at both seasons if he so desires.

In regard to the general management of such a cellar, all vegetable matter should be removed in the spring, the place opened wide and allowed to thoroughly dry out. In the fall none but good specimens should be put away and every care must be taken to prevent unnecessary bruising. The house must be kept well ventilated until the vegetables are cool and dry and only on the approach of dangerous cold should the ventilators be closed. From time to time during the winter the vegetables must be overhauled and examined and all diseased specimens discarded. By faithfully pursuing this plan there is no danger of wholesale rotting.

The various species of vegetables require different methods of management. Not having time to discuss every one on the list I have selected three which are particularly important in Vermont, the potato, squash and onion, all three being desirable winter vegetables. The potato undoubtedly ranks first and is worthy of first attention. This vegetable is stored for food and seed purposes on almost every farm and ought to be on absolutely every one. No farmer need buy potatoes either for food or seed but should have them to sell to city people. The potato is so susceptible to destructive fungi that special precautions have to be observed. The tubers should not be dug until the vines have ripened and fallen, this is necessary in order to avoid the thin skinned and immature tubers which are much less resistant to injury and disease. Discard all number threes or chats; it does not pay to store such material, for the space occupied by such should be utilized for better purposes. By slatting the bin a desirable circulation of air can be secured. Be absolutely sure that no diseased specimens are put away in the first place. It is a wise practice to overhaul the piles or boxes once in a while and discard the rotting tubers. These precautions will often save severe losses in the potato bin.

The squash is also a profitable and desirable vegetable to store. Our root cellar style of treatment will not apply here. The squash is best kept in a dry, moderately warm room, and one writer even states that any one by placing his squashes near the furnace may have them in perfect condition late into the spring. There are houses built purposely for squash, but we need not discuss them here. The farmer with a few squashes can put them away on a hanging shelf in his cellar, or better yet in some dry loft, kept at a temperature of 40° to 50°. Precaution must be taken to keep the squash from rats. Professor Stuart stored squash with good success in an upstairs room, which was quite warm. The squash must be handled carefully; the stem must be cut and care taken not to injure the skin. The storage of squash is worthy of more careful and extended attention since the practice of the same very seldom fails to return a handsome profit. As in all other vegetables discussed, diseased specimens must be discarded immediately.

Turning to the onion, we find it grown considerably in the Connecticut Valley of Southern Vermont in a commercial way. It should be grown on every farm in Vermont, if only just for home use. In the fall when the tops are ripened, pull the bulbs and rake into rows and allow them to dry for a few days. Then pull off the tops and on a dry day crate the onions and take them into a curing crib built expressly for this purpose. Here we leave them until thoroughly dried out, then sort into three sizes and transfer to a frost-proof house. For a farmer without these means, dry the onions in an open shed and then store away in a dry, cool place. The onion is valuable for food and often fine profits may be realized from storing the crop.

Cabbage is most advantageously stored in specially prepared pits. The heads should be laid downward and then covered with straw and then a layer of loam.

Celery ought to be grown more commonly as it forms a very delightful side dish for the winter table. Celery can be kept quite easily into the middle winter and we could not find a better place than our root cellar. Bury the roots in sand, the plants standing erect as in the field. By packing them closely together a large number of celery plants may be stored in a small space. Near Boston and other cities, we find specially adapted celery cellars.

So we might discuss the different varieties in detail, but the time is too limited and I must be drawing to the close.

Vegetable storage has not been studied carefully nor sufficiently enough. The fruits, which are less essential to human welfare, have received much more attention. It is clearly obvious that there are many problems waiting to be solved, especially when each species presents its own peculiar difficulties.

Vegetable storage may appear at first thought like an ordinary farm practice, carried on for centuries and presenting no

problems worthy of serious thought, but it seems to me, that in these days of extravagant meat and flour prices, it is to just such questions as these that we must turn for help. Methods and devices that will help in the preservation of vegetables into the late spring are full worthy of our thought. There are certain vegetables, as celery for instance, which may be kept much longer than we naturally suppose. Farmers and market gardeners must study and observe and realize the possibilities awaiting them. May our less favored branch of horticulture be given the opportunity to prove itself worthy. Let better storage methods defeat hign prices and keep the Vermont farmer ever prosperous and independent.

PRESIDENT'S ADDRESS.

(ILLUSTRATED LECTURE)

GEORGE W. PERRY, CHESTER DEPOT, VERMONT.

In looking around to see what could be presented to you with the most profit, I thought of something that seems to be generally omitted. At meetings of this society, and at other gatherings of fruit men, I have heard a good many learned people and a number of orchard men talk. Several times I have heard them discuss the important items in fruit growing. They have told us all about the proper planting and pruning of the trees, the cultivation, spraying and what not; but I have never heard one of them speak of the most important thing of all in fruit growing, the work of the honey bee. So it seemed to me to be my duty to take the matter up with you tonight. As a large part of my audience is composed of children, will try to do that most difficult thing, talk this scientific matter in language that every child can understand.

Did you ever think why the Lord so made this world, that in the animal kingdom to which we belong it is the universal rule that every new being shall be the offspring of two individuals instead of one? That is to keep the type up. If a single individual could produce his kind, then the children of the tall man would be as tall as himself and perhaps still taller, and of the short man as short as himself or shorter, and so on. Nature has provided for all this by giving us the inclination to choose our opposites in choosing our mates. The tall man usually selects the short girl, and the dark man the light haired girl, and so we keep

the race about the same all the time, instead of having a thousand different types developed. But though this was noticed very early in the history of man to be the fact in the animal world, it is only within a very short time, say twenty-five or thirty years, that it has become well-known that the same thing is true in the vegetable world. But as the plants cannot move about and select mates for themselves, something else has to be a go-between in the matter.

To make the whole thing plain to you, I must first give you a lesson in Botany. The green cup that forms the outside of the bud is called the calyx. Inside of that is a set of colored leaves that are known as petals. Next there are some long, slender bodies with large tips that are called stamens, and the tips are known as anthers. Inside of those is a central stalk with a bulb at the bottom, called the ovary, and an enlarged tip known as the stigma, while the whole stalk is called the pistil. I presume this is familiar to most of the children present, but I am putting it all in for the benefit of the grown-ups. Every one of these organs is necessary to the production of fruit or seed by the flower. I suppose you might think that the beauty and fragrance of the flowers were made altogether to please us. The Lord often does a thing for several purposes. The flowers may have been made to delight us, but their most important purpose is a very different one.

You remember that the stamens have knobs or bunches at the ends of them, known as the anthers. When the anther is ripe, it opens and discharges a golden dust, more precious than all the gold in the world, and which we have decided to call pollen. What part does the pollen play? At a certain time the top of the pistil, which you remember is in the center of the blossom, becomes sticky; and the pollen grains in some way are brought in contact with it, and adhere to it. As soon as the pollen grain gets well-fixed on the stigma, it sends out a sort of little tube right into the substance of the stigma itself, and this tube makes an amazing growth. It keeps on and on until it reaches the ovary, and then hunts around until it finds one of the baby seeds, or ovules, and penetrates it, and then the seed begins to grow, and the fruit that contains the seed also begins to grow, and then we say that the fruit has set. In the old botanies it was taught that the anthers of any flower discharged their pollen upon the pistil of the same blossom, but now we know that this very seldom occurs; but rather that the pollen must, by some contrivance, be brought from another flower. I will try to show you how this is accomplished.

There are many plants that have two kinds of blossoms on them, butternuts and beechnuts, for example. Those that contain the stamens are little hanging tassels, while near the ends of the branches are some tiny flowers which contain the pistils. The wind in this case renders the necessary service. Common corn is another familiar example of this sort of blooming. The tassel of the corn is a great mass of staminate blossoms, while down below the ear is a pistillate flower. The husks are the petals, and

the silk is composed of a multitude of pistils, one attached to every kernel. In order to have a perfect ear, at least one grain of pollen must fall on every thread of the silk. When the proper time comes, the wind carries the pollen over the field and sifts it down upon the waiting pistils. But there are many flowers in which the wind cannot render this service. When I was a boy my father told me I could pick off the false blossoms from the squashes to play with. Luckily I didn't do it very much. You remember that the one that the farmer calls a false blossom has no bunch at the bottom of it, while the other has a baby squash attached to it. If you cut the two open, you find them quite different inside. The male blossom has in the center of it a yellow column, which is composed of the stamens, and under this column are little pits containing nectar. The female blossom has a similar column, only it is larger, and it also has honey pits under it. The large yellow blossom helps the bee to find the flower easily under the broad leaves, and is of such shape that she cannot get the honey without rendering the service that the blossom needs. When Miss Bee goes out after honey, if she is looking for squashes, she visits squashes only all that trip, and so they need to be easily distinguished. When she goes down into the flower after the honey, she unconsciously rubs her back against the column of stamens, and smears herself with the pollen. Pretty soon she enters one of the female or pistillate blossoms and then rubs off some of the pollen onto the pistil of that blossom, and so crosses the flowers. You could not have a squash or cucumber or watermelon, you see, without the bees.

There are some plants in which the two kinds of flowers are on two separate trees, like the willows, but I will not spend any time with them.

Now I must give you a short lesson in the honey bee. I show you the proboscis by means of which she gets the honey, with a portion cut away so you can see that it is a tube; and at the end of it there is a sort of spoon. She lets this proboscis down into the bottom of the flower where the honey is, until she has sucked up all she can carry, and then goes home and puts it in the comb. The bee has use for the pollen too. If you look at the legs of the bee, you will see that they are hairy at the last joint. When the bee gets a lot of pollen on her back, she scrapes some of it off and fastens it on these brushes and carries it home to feed her young. The under surface and back of the bee are also hairy so the pollen will adhere to them readily. I suppose the bee thinks that is all the pollen is for and does not dream that she is rendering a very important service to the flower in pay for the honey.

But when the blossom contains both stamens and pistil, as most flowers do, why is the bee necessary, and why does not the pollen of the flower get onto its own pistil? If it could, there would be no crossing, and the law of double parentage with which I

started out would not apply. But the flower has many contrivances to prevent that. Here are some blossoms from a common plant, the fireweed. The first one opened to-day, and the pistil is curled back out of the way, and the stamens stand out where they will strike the under surface of the bee when she is getting the honey. The other blossom opened yesteiday, and now the stamens have curled back out of the way, and the pistil has placed itself in position to receive the pollen that the bee took from the other blossom.

(Mr. Perry showed by means of pictures on the screen, many interesting contrivances by means of which plants secure the service of the bee in producing cross fertilization, among them several orchids.)

It would seem at first sight as if there was no cross fertilization when the pollen is carried from one flower to another on the same plant. Let me tell you something that is not in the books. The tree or plant is not a single individual, but a colony. There are many animals arranged in the same way, of which the coral is the most familiar example. In this case a multitude of animals have a common body, and each separate polyp grows out of it, exactly as does the blossom on the tree. So you must think of the apple tree when it is in bloom, not as one individual, but as a colony of several thousands of individuals. The apple tree produces on each fruit spur a whole cluster of buds, which open successfully, the operation taking several days. In any one flower the stamens and pistil do not come to maturity at the same time, so it cannot pollenize itself. The central bud opens first, with the stamens ready to shed the pollen, but the pistil not yet ripe. The next day some of the other blossoms open and are in the same condition. But during the night the first blossom has matured the pistil and the stamens have shed their pollen. This has been going on all over the tree, so there are a lot of flowers with mature pistils and another lot with mature stamens. The bees, in search for honey, carry the pollen from one to another, and then the fruit will set. It is barely possible for the wind in a few cases, by threshing the branches together, to render this service, but this is not likely, as the pollen is somewhat sticky. If you cut an apple in two crosswise, you find it has five cells, and each cell contains seeds. You also find that the pistil has five prongs or points in its stigma. In order to have a perfect apple, some of the pollen must get onto all five of those points, and must send its tubes down into all five of those pockets. Don't you see how it happens when we have a cold, rainy week, and the bees do not venture out, that we have no apples, even though the trees have bloomed very full. The Government has proved beyond the shadow of a doubt that not a pear or peach or apple can be grown without the service of some kind of a bee. In studying this matter they discovered that some kinds of fruit are self sterile, and must be crossed by the pollen from another species of the same kind of

fruit. The Spitzenburg apple, and the Bartlett and Anjou pears are some of them. In many other cases the fruit is much better if the different sorts are crossed, and so it is advisable to mix up the trees in the orchard.

I saw the other day in a recent Government report, that a year or two ago bumble bees were sent to the Philippines, and now they were able to raise their own clover seed. The honey bee's proboscis is too short to reach the honey in the blossoms of the red clover, and yet the clover cannot bear seed unless it is crossed by something. But the bumble bee is better equipped, and can get the honey, and pollenizes the flowers. Several years ago a thousand dollars were sent over to this country from Australia to import bumble bees for the same reason.

A year ago last winter nearly all the bees in Grand Isle County died, even the wild ones. Yet the orchardmen have made no move to replace them. In many orchards there have been no apples since, although there has been an abundance of bloom. There has never been nearly enough of them kept. My friend, Mr. Phelps, has forty acres of orcharding, and not a single swarm of bees; and yet this year he had the best crop of apples in town. Ah, but his next neighbor has thirty swarms and no orchard. He ought to send his check over to him for a couple of hundred dollars. I suppose some of you will say that there are plenty of wild ones, and they will answer. Would you trust the enrichment of your land, the fertilizing of your soil, to the chance droppings of the birds that happened to fly over it, or to the incursions of your neighbor's cattle or hens? That would be just as wise.

Let us appreciate the honey bee. You can grow some sort of fruit without pruning, or spraying or cultivation, but you can't grow a single apple without bees. Here is a little insect that does a service for you that is indispensable, and he collects his pay as he goes along from the work itself. It is a busy little insect, and next to man himself in intelligence. They have learned to divide up the work among themselves and each one do one thing, just as we do. Some get honey, some build comb, some take care of the babies and some keep the house clean. In one thing they have become wiser than man, for they can make their offspring of any sex they please.

TEMPERATURE AN IMPORTANT FACTOR IN HORTICULTURE.

PROFESSOR F. W. MORSE, AMHERST, MASS.

In a general way, we are well aware that heat is an essential factor in plant growth. Yet outside the forcing house, little attention is paid to its control in any way, while inside of such a house, the florist or market gardener, usually regulates the temperature by rule of thumb.

It is my purpose to show that there are simple, fundamental principles in this relation between heat and growth, to which more attention should be paid, especially in the intensive culture of crops that is required by our climatic conditions and encouraged by our nearby markets. In our latitude, we can expect only a short growing season at best. Furthermore, our diversified surface varies this growing season because there are so many different elevations and exposures within a small area.

Why is heat necessary to plant development? Because the life of the cell is due, at least in part, to chemical action within its walls. It is not necessary, nor is there time, to go into details about these chemical reactions. Some of them can be copied in the laboratory with glass vessels in the place of plant cells, while others are yet unknown to us except by their products. The evidence so far collected shows that chemical reactions inside of plant cells must follow the same laws, which govern chemical action in the laboratory.

With few exceptions, heat always increases the chemical activity of a mixture of substances, especially in solutions. The higher the temperature is raised by the use of lamp or furnace, the faster the reaction goes on. Sometimes it goes too fast and there is trouble, because it gets beyond the chemist's control.

Most chemical reactions conducted in the laboratory are found to do best at definite temperatures, called optimum temperatures. Below its optimum a reaction goes too slowly, while above it, the chemist loses control of it and there may be an explosion or a new reaction may begin which is not wanted at all. One of the first things which the chemist has to learn about a process is its optimum temperature. Another law governing chemical reactions, is that controlling the rate at which it increases as the temperature rises. It is usually stated in this manner. The speed of a reaction doubles with a rise of 10 degrees Centigrade, which is equivalent to a rise of 18 degrees on the common or Fahrenheit

thermometer. In some cases the reaction even triples in speed with the above increase in temperature.

The relation between heat and plant growth should be the same that exists between it and chemical action, and so far as experiments have gone it has been found to be so.

Gardeners with glass houses have clearly established the fact that different classes of plants require different optimum temperatures, and their houses are regulated accordingly. It is not always the temperature of most rapid growth because in some cases quick growth means poor quality. I am not a horticulturist so I will not attempt to give the temperatures which are found best for roses, carnations, lettuce and tomatoes. All gardeners recognize that one cannot grow them to perfection together; but that best results can only be reached by having a house for each crop.

It has been demonstrated, also, that at too high temperatures, plants cease to thrive. This is not so generally known, because it rarely happens in ordinary garden practice that too much heat is present. Just what the high temperature does is not known, but probably the balance of chemical action is upset by one reaction going too fast for its control by another, and the consequent development of poisons in the plant cell.

The rate at which plant development increases by the application of heat, follows the same law that chemical action does and doubles or more than doubles with an increase of 18 or 20 degrees. This holds true only for the range between the point of least growth at about 40°, and the optimum temperature. I have found the law to apply to the different stages of plant development: namely, germination of seeds, growth of stem or stalk, and ripening of fruit.

My attention was called to this relationship when studying the change in ripening apples under different conditions of storage. It was already well known that several chemical changes take place in ripening apples after they are picked from the tree. The principal ones are the change of starch to sugar and the change of one kind of sugar to another. The effort was made to determine the rate at which these changes take place at the different temperatures used in storing fruit in cellars and cold storage houses. The changes were too complex, however, to get any definite results.

One interesting fact was brought out in this work which led to the later methods by which the rate of change was accurately measured. It was found that though apples steadily lost in weight, which one would naturally think was due to evaporation of water, the proportion of water to dry matter did not change, in sound, firm fruit, even when several percent of the original weight had been lost. The only explanation for this phenomenon was that the solid matter of the fruit was destroyed by a breathing process by which the cell contents as sugar, were changed to carbonic acid and water. Plants, as well as animals, breathe in oxygen and breathe out carbonic acid and water, but the rate is much slower.

An apple after removal from the tree is still a mass of living cells and the chemical processes within them are similar to, if not the same, that went on before the apple was picked. The measurement of the carbonic acid offered an accurate method for calculating the rate of chemical change at different temperatures. It is a substance comparatively easy to collect and its determination can be made with great accuracy, with simple apparatus.

By means of the carbonic acid, it was found that even at 32 degrees, there was chemical action going on. When the temperature was raised to 50 degrees, the carbonic acid was twice as abundant as at 32 degrees, and on carrying the temperature to 70 degrees, the amount doubled again or was four times the amount given off by the fruit at 32 or 33 degrees.

The study of the growth of stem or leaf offered more difficulties than the fruit because of the trouble involved in making correct measurements on a growing plant. I recollected, however, that when a boy I used to help in the asparagus field and that the new shoots varied widely in their rate of growth with changes in temperature. It was not uncommon for us to get twice as many stalks on a really hot day as was obtained on one of moderate temperature, while on cool days, the growth was very slow and the cut would be very scanty. Another fact about asparagus, which no doubt many of you have noticed, is that it will make considerable growth in water after having been cut from the crown. Therefore asparagus stalks were used in this second series of experiments. In this study, the individual stalks could be measured readily, and the rate of growth was determined by the amount of elongation of the stalk in a given time. Some specimens were kept in a refrigerator, others at room temperature, and still others at the high summer heat possible in an incubator.

The first comparisons were made between the temperatures of 62 degrees and 82 degrees Fahrenheit. At the lower temperature, the stalks were placed under a bell-jar and a stream of water was kept running over the jar. At the higher temperature, the stalks were placed in an incubator. In these comparisons, the stalks remained in their respective surroundings until they had ceased to increase in length. At 82 degrees, this limit was reached in the first 24 hours; but at 62 degrees, it required a little over 48 hours before growth ceased. The actual amount of growth was practically the same for both sets of stalks, and the comparison was therefore between the lengths of time required to produce it.

Other comparisons were then made between the growth that was possible in an ice-box maintained at a low spring temperature, namely, between 50 degrees and 55 degrees, and the growth that was possible at summer temperatures of 70 to 75 degrees. The latter temperatures were maintained in a warm room over night which in June was an easy matter. In these trials the amount of increase in length of stalks in 12 hours was determined. The average result was a tripling of growth at the higher temperature,

while in no case did it happen to be less than double. There were used in all 37 individual stalks and the comparisons were made at six different periods of the season of asparagus cutting.

Bacteriologists have obtained similar results with the development of bacteria. I do not know that they have made specific studies for that purpose, except in a few instances. In a study of a fungous disease of the cotton plant, Balls found that it developed in accordance with the law for acceleration of chemical action. Russell in his "Experimental Bacteriology" states that at room temperature or about 68 degrees, cultures will have reached their maximum growth in about eight days while at blood heat, or about 100 degrees, it will require not more than 48 hours to produce the same development. Here we have a quadrupling of the growth with an increase of about 32 degrees.

In the germination of seeds, Johnson in "How Crops Grow," reports German experiments where it is possible to make comparisons of the speed of germination at different temperatures. The activity of the process was rather more than doubled by an increase of 20 degrees. It is unnecessary to go further into this part of our subject. Enough has been said to clearly show that the relation between heat and plant development is the same as is chemical action. A thorough understanding of these facts will show one that there are many practical applications of these laws of optimum temperature and of acceleration with increase of heat.

Beginning with seed time, both the optimum temperature and the law of acceleration have an application. In a general way we are aware that seeds sprout much faster in a warm soil than in a cold one, and it is not infrequently that two sowings of early peas or corn made two weeks apart by the calendar, yet come up together. I am not a practical gardener, as I have said before, and what I now say is the expression of a theorist, yet I believe it is worthy of trial. The planting of seeds early in the season as soon as the ground can be worked is a haphazard method, as every gardener knows. It is a venture, which may succeed, and may not. Instead of this uncertain way of planting, I believe it is possible to observe the temperature of the soil with thermometers, until there is warmth enough shown to produce a fair rate of growth, or about 50 degrees. Then seeds can be germinated in the house at their optimum temperature, which will require but a day or two before the rootlet is seen, and then there is certainty where before was uncertainty. In experiments reported in "How Crops Grow," our hardy seeds will germinate at as low as 40 degrees, but they will germinate fastest at a temperature of 80 to 90 degrees which is a point almost never reached in the soil until midsummer. Good growth will be maintained, however, at 50 to 60 degrees, therefore by saving time in germination we are able to plan with a fair degree of certainty for a succession of crops. With the competition from the South, it is not so

much a matter of earliness as of certainty which is needed in our gardening.

But it is in the growing period of the plant that this definite relation between heat and growth is most important. It is seldom, if ever, that the optimum temperature for plant growth is reached in our latitude, especially for such crops as beans, corn, melons and tomatoes. A difference of two or three degrees of heat throughout the season, between localities, will make several days' difference in maturity of the plant. Such differences are to be found between different localities in our States of New Hampshire and Vermont. In some cases it is due to latitude, in others to elevation and in still others to the direction of the slope of the land.

June, July and August are the important growing months taken as a whole. May and September can be used only in part, because killing frosts may occur at any date during them although the average may be set at about the middle of each for the southern sections of these two States. A comparison of the mean monthly temperatures for the months of June, July and August has shown that there is a difference of four degrees throughout the three months between Nashua in the southern part of New Hampshire, and Stratford in the northern part, while Concord, in the center, is almost exactly midway between the two extremes. Grafton and Plymouth show the difference due to elevation. Plymouth is about 12 or 15 miles farther north than Grafton in a river valley, while Grafton is one of the highest towns in the State. Plymouth is a trifle more than two degrees warmer throughout the season. There are undoubtedly similar differences in Vermont.

Differences due to the lay of the land may occur on the same farm. On a southern slope of 18 degrees, the temperature of the soil has been found to be three degrees higher than in the adjacent level portion of the field.

The condition of the soil also makes small differences in the temperature, such as the amount of moisture, rate of evaporation, color of the soil, texture and so forth. The best temperature conditions seem to be obtained in a dark loam, with sufficient moisture for growth, kept from evaporating by a thin soil mulch. Stable manure and good tillage promote this state since the former adds humus which colors the soil, and the latter regulates the moisture supply by controlling evaporation.

I have been unable to get much exact data about relative effect on a crop of continuous differences of two or three degrees of heat. There are numerous observations which record in a general way such results, but it is seldom that the actual temperatures of the amount of growth is known. It is a line of research well worth the attention of our Northern experiment stations because in no other way can we accurately judge of the difference in probable maturing times of a given variety for different localities.

For one illustration I will relate the variation in growth of a lettuce crop in one of the New Hampshire College forcing houses last winter. The house was a south wing of the main conservatory. One end was therefore separated from the main house by a glass partition, while the other end was separated from the outside atmosphere by a similar glass wall. The main house was kept at a tropical heat for palms and therefore much warmer than the lettuce house. The temperature of the lettuce house was regulated after a thermometer in the center of the wing. My attention was not called to the crop until it was ready for the market, when the gardener spoke of it as a good illustration of the effect of variation in heat. The lettuce nearest the main house was easily seen to be about twice as large as that in the middle of it, but was soft and not fit for shipment, while the plants at the end farthest from the palm house were stunted in appearance and not much more than half as large as the standard plants in the center.

The actual differences in temperature of these three portions of the wing were unknown. Several years ago, I was trying several varieties of Western dent corn, and took especial care to select those which were classed by the seed men as early varieties adapted to Michigan and Minnesota. Two or three were claimed to mature in from 90 to 100 days. We can safely reckon at Durham, on 100 days between killing frosts. However, no variety matured that summer although it was more than 100 days from planting time to frost. There is a difference of two or three degrees in summer temperatures between Southern Michigan and New Hampshire. How long a time would have been required to mature that corn could not be determined. Recently in a bulletin on potato growing, I saw the statement that Southern potato growers find that Northern grown seed will mature in two weeks less time than the same variety grown from Southern seed. The converse experience should be true with us, namely, Southern grown seed should be slower to mature with us than seed grown in our own locality. Such observations as these, only emphasize the need of carefully conducted trials under known differences of temperature.

The application of this principle of heat and chemical action in selection of varieties is of great importance to us Northern people. There is a probability that the plant accustomed to a warmer climate than ours will produce seeds which in turn will yield crops whose best growth requires a higher heat than our surroundings will give. This is because the chemical action in the cells requires a little higher optimum of heat. Such an observation as that with the corn and the potatoes shows that we shall do best when we carefully develop our own strains of seeds. It is not wholly a question of purity of type, but of adaptability to climate as well.

I am confident that experiments can ultimately put this matter of maturity at different temperatures on a mathematical basis, when fertilizer and moisture conditions are at their best as they should be in intensive gardening. We can control the food and water supply of our garden crops, and by calculation should be able to determine the probable time of maturity in a season of average temperature or of abnormally cool weather.

With crops like corn and melons it is probably the fact that a summer of high maximum and low minimum would produce better results than when the same mean temperature was obtained with a narrow range. The increase of growth due to high temperature is faster than the decrease due to a falling off of heat. Then it is also probable that such crops need at fruiting time a higher heat than merely to make leaf and stem. We have evidence of that in the efforts to grow our sweet corn and melons in England and Northern France. They will not mature there although their climate is generally milder than ours but lacks the intense heat of our midsummer.

Many fruits are there ripened by growing them on the south side of a wall where they get the benefit of a higher heat than is possible in the open. We can get similar effects on our southern slopes in our hilly regions.

The melon region of Rocky Ford, Colorado, has a temperature that averages about four degrees higher throughout the summer season than our summers do in our southern counties, and its maximum temperatures are nine degrees higher. By selecting our best exposures and maintaining the warmest soil conditions, we can raise melons here equally as good as can be raised there, but on limited areas. The experience of the potato growers should be kept in mind and we should grow our own seed for our own locality.

Two different results are possible when we grow crops under different temperatures. The higher degree of heat may produce an increase in size or it may cause it to mature earlier. Moisture exerts an important influence in this connection. If there is an abundance of water, there will be a larger plant, as in the lettuce crop. If there is a scanty supply of water the maturity will be hastened with a small yield. This is the experience of the corn grower in the South who plants early to avoid the summer drought as his yield is thus much larger than when the corn is planted later, although the later corn will mature in a much shorter time.

In general it may be said that a large yield of grain requires a large plant if there is time to mature the seed. Hence in the corn belt varieties are grown that will require the whole of the available growing season in which to mature. So far as I can ascertain the average period is from 130 to 135 days there, and in our State it is narrowed down to about 95 days. We get often as much grain as the corn belt farmer produces per acre but it is by a forcing process.

One interesting fact about this difference in length of season between here and the corn belt, is that it accords with the law of acceleration of chemical action. The difference in temperature between our section and that is a continuous summer average of 8 to 9 degrees. The acceleration of chemical action follows a geometrical progression, and the percentage of increase for 9 degrees is 41. Their corn season for their varieties is about 40 percent longer than ours. By the same reasoning, if they used the forcing process used by us with manure, their yield should be at least 40 percent better than ours.

The mathematical increase for one degree Fahrenheit increase in temperature is approximately 4 percent, where the increase is 100 percent for 18 to 20 degrees. It would be well worth while for botanists and horticulturists to determine how closely plant growth will follow the law. There are many ways by which growth may be forced beyond that which natural conditions would favor. Some of these methods are in reality dependent upon this law of heat effect for their results and thus make its study one of importance to the practical gardener and farmer. The practical application of the law of acceleration of chemical action by heat finds its most definite conditions in the storage and ripening of fruit after it has been picked from the vine or tree. Many fruits are picked green for shipment and afterward ripened. While this ripening has been carried on in an empirical way, yet the results of the practice has been to show that it can be retarded or hastened as the temperature is varied.

With the apple crop we now have definite experimental results showing that the keeping season is much affected by the temperature of storage. Both experiment and practice have clearly shown that apples keep best at a temperature as near freezing as possible. When kept at temperatures above this the time of keeping grows shorter the higher the temperature is. The importance of this at picking time is little realized by the majority of apple growers. It is a common occurrence for the temperature to run in the seventies in October after the fruit is picked from the trees. It should be kept clearly in mind that every day of exposure to this heat has advanced the ripening of the fruit as much as four to six days would in cold storage. A week of warm weather in October will shorten the keeping time a month in the spring, if the apples are intended for cold storage.

Cellar temperatures are, as a rule, ten to fifteen degrees above freezing until midwinter. Many trials with a large number of varieties at the New York Experiment Station showed that apples kept about two-thirds as long again in cold storage as in the cellar or cool house. This is a fairly close approximation to the law of acceleration. An increase of 66 percent would require a difference in temperature of about 14 degrees.

It is often remarked that cold storage makes fruit decay faster after removal than fruit not so kept. The real explanation

is that fruit is kept as long as possible in storage and when removed to a summer temperature of pantry or market the decay becomes so much accelerated that the fruit is soon spoiled. In such cases we have an increase from 32 degrees to about 70 degrees. The chemical decay of the fruit and the germs of fungous decay, both more than quadruple at this increase in temperature and the fruit is soon gone. But had it not been in cold storage it would have decayed weeks and perhaps months before. It is a common mistake to regard cold storage as a place where fruit remains unchanged and unchanging, but this is not so as has been pointed out earlier in the description of the experiments with apples in the respiration apparatus.

In conclusion, I believe that it is positively shown that the development of plants is dependent on heat just as chemical action is dependent on it, and this is because chemical action lies at the foundation of plant growth. Plants require an optimum temperature for their different phases of life, and these phases are accelerated or retarded in the same proportion that chemical action is modified by heat. Since this acceleration is a geometrical progession, it should be possible to work out with a close degree of approximation, the amount of variation to be expected with changes of a few degrees from normal.

THE APPLE, A COMMERCIAL ASSET IN NEW ENGLAND.

PROFESSOR A. G. GULLEY, STORRS, CONN.

The recent fruit show held in Boston established the fact, long claimed by competent judges, that New England could grow apples of the highest grade, a fact much doubted by the average consumer in the large centers, and as well as by many of those handling New England apples. Sales of fruit made at the show, or at its close, showed that buyers fully appreciated that as fine fruit could be found there as at any of the fancy fruit stores, as they were willing and did pay fancy prices for the products shown there.

With these two points established by producing the fruit and making the sales, the proposition at once presents itself—that if growers can grow apples on land valued at $100.00 or more per acre, without improvements, and transport them 3,000 miles, and sell in our markets at a profit, what is the prospect of the New

England orchardist on our much cheaper land with an advantage of at least one dollar per barrel in transportation charges to grow apples for the same market.

This statement of the proposition has been made many times by those who fully understand the conditions and many shrewd men have seen the opening and are beginning to profit by it. But it needed such a demonstration as that recently made at Boston to prove to the public at large, including many growers, that the fruit could be grown, and of as high grade as that sent from the West. If similar exhibitions are held the next five years in the great Eastern markets, and be backed up by the production of fruit to meet the demand, we shall hear but little more of the Western apples supplying all the high-grade trade.

It is to be regretted that every commercial apple grower in the East did not spend at least a day at the show, and note what first class fruit means, or what constituted a package of fine-grade fruit. Many of them have much to learn in that respect, or even just what a good number one apple should be.

Many growers in various parts of New England have already demonstrated the importance of the apple crop, and there is a growing interest in it in many sections. However, many who have started into apple growing do not fully realize the importance of of the opening that is before them, largely from the lack of knowledge of the above-mentioned points. They will not reap the full benefit till they learn that only good products shall be grown and marketed, and not fill the centers with low-grade stock—and particularly that far below the grade that it is marked.

Here is most of the trouble and where Western apples have forged ahead and Eastern stock credited with a bad name. When growers generally understand that it only pays to grow and market such fruit, and that it can be produced on a great share of our New England land, it will at once add to the value of much of the now low-priced lands, for it is a business that can be readily carried on, in Connecticut at least, in the back sections where there has been the most complaint of so-called abandoned farms.

Some branches of fruit growing have already been developed by men on this type of lands, proving that they are well suited to such crops. One of the largest producers of peaches in Connecticut today, began on such a location with very small capital—only about fifteen years ago.

The apple is especially fitted for growing in such sections, for, although bulky, is a good crop to handle at a distance from a shipping point, and the choice of the time to ship is also somewhat at the command of the grower. He may also ship all at once in a wholesale way, and is not obliged to force his products upon the market. The use of those lands would tend to fill those sections with population again, which admittedly has gone from them, a matter of great importance to some of the small country towns.

The development of these lands in other directions than that

of dairying or some of its branches, which is usually looked upon as the only one adapted to them, is very important. It widens the scope of usefulness of those sections, but in addition, opens a new line of occupation which may be more attractive to many, or indeed, may be readily united with it, although I am not an advocate of such combinations.

The commercial aspect of the apple crop demands that we pay more attention to the fact that no grower can produce all high-grade fruit. Many can much increase the proportion of good marketable fruit, and there is market for it, nor do I think that alone should be sent to market. There is, and always will be, a demand at fair price, for number two apples for cooking purposes and for those that cannot afford the strictly high grade, but below that, all should go into special products and be kept of the general market. This would of itself add to the demand for the higher grades.

The very fact that most New England growers are too near the large markets, and be able to get something out of almost anything sent there, has resulted in almost wholly overlooking the various methods of using the poor fruit at home and, except the making of cider and vinegar, not much has been done. Plans need to be developed to use that fruit in by-products.

I do not know of a fruit evaporator in Connecticut, while in the apple-growing sections of New York and Michigan they are to be found in every small town and often on the farms. Canning, jelly making, boiled and prepared cider, and other such products, must be developed to fully derive the entire profit of the crop, and down the public market for fresh fruit free for the portion that should go there. Then the temptation to ship poor fruit would be obviated and, no doubt, the better grades would be improved.

We hear so much about the fine Western fruit that the impression prevails that only that is grown. This is not true, but as that is the only kind that pays to ship, they are forced to send only that, and keep the rest at home. This also obliges them to adopt every method to make the proportion of high grade fruit as great as possible. To this end every modern idea is taken, and every method adopted that will improve the crop. Many of these methods are not yet taken up by the average grower in the East, but will have to be before we can fully compete with the Western orchard men. This not only applies to the very thorough culture, there general, while here only the exception as yet, but to their combined or co-operative packing as well, that large lots may be known to be of exact grades.

Apple growing should be looked upon as an investment from which to draw regular returns rather than as a business from which large amounts are to be taken within a short time; a place from which to receive a permanent income. If properly placed and invested, and the right culture given, the investment will prove

a permanently paying one, and the invested capital will also increase. At the present time, good care must go with the investment and every precaution taken to obtain the best results both of culture and market.

Personally, I do not advise planting in a very small way as a commercial proposition, not less than five to ten acres, and as much larger as possible. Then the grower can afford, and will be forced to get, the proper appliances to economically handle the orchard and be less tempted to make it a side issue with some other business, and when a crop is grown, one can command the respect of the buyers. The only exception might be where several small growers in a section together should combine in tools and marketing, an idea not often a success in the East.

However, from present outlook, I do not hesitate to advise the young men to take hold of this branch of horticulture in almost any reasonable place in New England. While by no means a young man, I am backing my opinion by adding to my orchards every year, although the oldest I own in the State are not bearing. I feel sure I shall soon receive a profitable return for any capital put in the business.

APPLE GROWING AT HOOD RIVER, OREGON.

J. L. HILLS, DIRECTOR VERMONT EXPERIMENT STATION. *

***The writer is indebted for the cuts illustrating this article to the courtesy of the Oregon Experiment Station.**

The writer spent a part of a day last August in the famous Hood River Valley in Oregon, being one of a party of Agricultural College and Experiment Station people who were being entertained there. The members of the party were naturally given every opportunity to look over the operations and to inform themselves as to the local horticultural situation. It seemed worth while to bring home and to report to the orchardists of Vermont what appear to be the reasons why Oregon apples are today so important a factor in the markets of the world. The writer most thoroughly believes in the correctness of the thesis that there is no better apple grown than has been and can be grown in Northern New England. He believes the Champlain Valley can produce as good a Spy as can be grown anywhere in the world. Yet the fact is that to an increasing extent Eastern markets are being flooded with

Oregon apples, which are selling at high prices at times when New England apples of equal quality are missing. It is not so much what New England can do, but what she does do. What then can she learn of Oregon to her advantage?

Hood River is but one of a number of sections in the Northwest where apple orcharding obtains. It was one of the first to standardize its methods of handling orchard products and its methods have been copied elsewhere. What holds then for Hood River holds for Northwestern apples as a class. The first orchard in this region was established in the early fifties. The bulk of the development has taken place within the past decade. From this valley alone there was last year sent out in excess of a quarter of a million of boxes of strictly first-class fruit. Buyers now come there from all over the world.

As the writer looks at it, there are six primary causes for the success of Hood River apple orcharding. These may be listed as:

1. The soil and climatic environments.
2. The attainment of quality.
3. The limitation of varieties.
4. The accurate grading by non-interested parties.
5. The attractive and uniform packing
6. The intelligent and wide-spread advertising campaign.

Let us review these various causes for the success of Oregon apple orcharding:

1. *The soil and climatic environment.* The soil in the Hood River Valley is a volcanic ash. The entire Northwestern country inland from the sea is an old lava bed. The peculiar character of the Hood River soil was very evident to us all. A fine, almost impalpable, whitish dust, rich in forms of plant food other than nitrogen, and of good texture, it seems especially adapted to apple growing. The climatic conditions are favorable. Sunny days and cool nights serve to develop good color and high flavor. At either end of the valley are located the snow capped, glacier clad peaks of Mt. Hood and Mt. Adams, which serve to temper the summer's heat, whereas in winter the warm winds from the Japan current, the so-called "Chinook" winds, serve to maintain a moderate winter temperature. It is said that on only about seventy-five days a year does the temperature fall below 32 degrees and that on but nine or ten days does it exceed 90 degrees.

2. *The attainment of quality.* The quality of Hood River apples is secured before they are picked, graded or packed. This is due particularly to the careful attention paid to tillage and to spraying. This quality is quite as much a matter of color as it is of flavor. Not but what Oregon apples are fine-flavored; but they are in no sense superior to the better grades of Eastern apples. Equal or better flavored and as well tinted fruit is grown in New England, but not by every orchardist as is the case in the Valley.

Moreover, Eastern apples are more uneven in size, more apt to be worm infested, and are less carefully graded. Clean cultivation obtains throughout the valley. The writer did not see a single mulched or grass clad orchard. This practice of itself to a certain extent serves to lessen the number of insect pests; but more surely to combat them, a most rigid system of spraying is carried on, so successfully that only a very minute portion of the fruit is imperfect. As the writer understands it, the spraying proposition is a community enterprise. It is not a matter of individual initiative. Every orchard is sprayed. Moreover, Smith, Jones, Brown, Robinson and fifty others do not carefully spray their trees, while Adams, a malcontent, and a disbeliever in spraying, leaves his orchard untreated, thus permitting the unmolested insects to spread from his place to those of his neighbors. It is each for all, and all for each. Everybody sprays. The spraying is not alone for insects but for fungous diseases. The tree trunks are white with the lime-sulphur wash used against the San Jose scale and look like so many whitened sepulchres. And the result of this united endeavor is a most emphatic endorsement of the policy. It is stated by a disinterested and careful observer as illustrative of the thorough manner in which spraying was conducted in one orchard that 2,000 boxes of strictly first class fruit were sold therefrom in 1907 and that but 60 wormy apples were found in the entire crop.

Hood River apples must be fruit of uniform size. To that end it is customary for orchardists to go through their orchards early in the season and to thin out fruit when it is small, in order that the remaining fruit may attain greater perfection. I would not be understood as saying that no small or otherwise inferior apples are grown; far from it. But they do not enter the Market as Hood Rivers. They are sold usually in near-by communities such as Portland, Seattle, etc., to the cheap trade, unbranded. It is inevitable that some such occur even under the best of conditions; but the orchard practice here is such as to minimize their numbers and to secure their sales in such fashion as not to imperil the good name of the community trade mark.

3. *The limitation of varieties.* Hood River is given over almost entirely to horticulture, apples being the leading crop. The Yellow Newtown and Spitzenburg are the leading varieties. Last year the valley contained about 175,000 of the former and 150,000 trees of the latter variety. There are also grown some Jonathans, a few Hood River Reds and some others in scattering lots. No attempt is made to grow an apple museum. Each man does not follow his own predilections or fancies and grow a menagerie of apples of all sorts and descriptions. Only a few high-grade, high-priced varieties are set and these are grown to perfection and perfectly packed, widely advertised and remuneratively sold. To a small extent pears, cherries and peaches are grown. Strawberries are also an important crop. The essential lesson for Vermont growers to learn in this connection is the advisability of the

limitation of varieties. Compare with this the situation found in the Vermont Experiment Station survey of Grand Isle County of some years ago. where over 100 varieties were found, many of them commercially useless.

4. *The accurate grading by non-interested parties.* One of the most interesting and significant features of Hood River apple growing is the grading of the fruit, by the Hood River Fruit Growers' Union. This is not a union in the opprobrious sense of the term. There is no compulsion. Some of the apple growers do not belong to it; but over 90 percent of the orchardists hold membership. The rules of this organization are very strict in certain matters and particularly so as to the grading. Each orchardist picks his own apples; but the moment that they have passed from the tree into the picking basket, or from the basket or pail to the storage house, he ceases to exercise control over them. They go then into the charge of the agents of the union. John Smith grows his apples, but John Smith has absolutely no more to do with the grading of his own property than has the King of the Cannibal Islands. If he presumes in any way to criticize the grading of the union's agents, the presumption is against him and not against the grader. In other words, his complaints are stopped immediately and automatically. Moreover, the grading, being the work of disinterested experts, is done in a uniform manner. There is no temptation to defraud the ultimate consumer, as is so notoriously common in the packing of Eastern apples. Furthermore, in grading and packing, marks are placed upon the lots or boxes indicating by letter, number or some cabalistic sign what individual did the work. The union employs traveling agents who appear unexpectedly and who check up the grades and packs. If, by any chance, this traveling representative finds graders unduly favoring any individual, or doing aught but exact justice, they are warned once and discharged on a second offence. Every effort is made in this way to secure uniform grading and to remove the temptation to sell an inferior product at the price of superior wares. This system has resulted, so far as grading and packing is concerned, in such absolute uniformity and such complete standardization, that it is customary now to sell carloads of Hood River apples in transit and on the statement of the grade as offered by the union. Large lots pass from hand to hand in sales without a single box being opened, and with complete assurance as to the grade being up to guaranty. There was no one thing which struck the writer so forcibly in connection with this enterprise as the manner in which, by the employment of this simple expedient, there was secured a square deal with a round fruit.

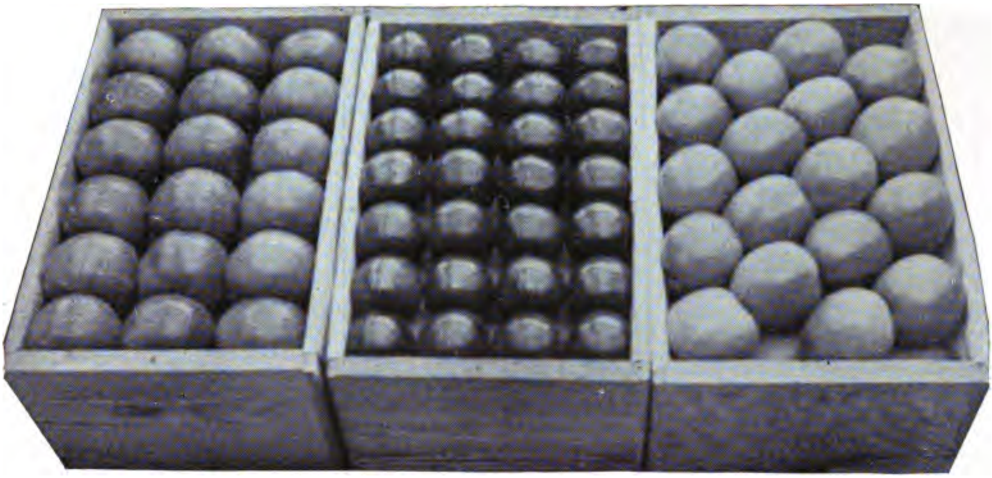
At first blush it may strike Eastern orchardists as unreasonable to ask a grower to hire another man to grade and pack his fruit. He is apt to take the position that he is entirely capable of doing it himself to his own satisfaction, that he grades honestly and

Grading board. A common board or piece of paste board in which are cut holes representing the sizes of the various tiers, (3), (3½), (4), etc. A packer has to use such a board but a short time, when he learns properly to size apples.

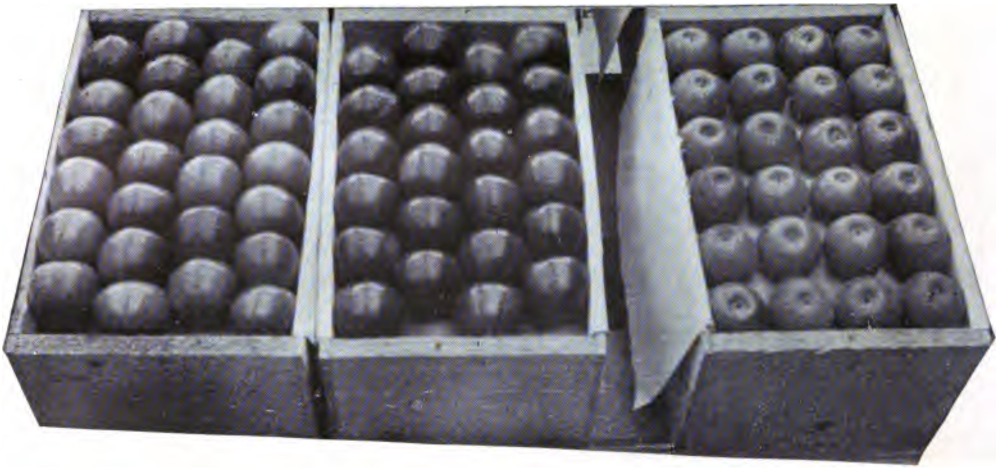
Packing table for (4) *packers.* The use of tables admits of better packing and grading. Some accommodate 2, some 3, some 4 packers. The tops are made of strong burlap, hanging loosely, with hose pipe as a rim. No sharp points or corners appear anywhere. The tables are strong and well braced, about three feet high and of convenient area. Endeavor is made to clear the table eight or ten times daily so as to avoid too much handling of individual fruits.

Nailing press. The pressing and fastening of boxes is an important feature of the work. In the type above picture there are many sorts, the arms are thrown toward the box where the lever is pressed, placing the strips true and holding the cleats in place. Further pressure brings the cover down tight.

Three boxes, one packed too flat, one just right, and one too high. A proper bulge is wanted. Beginners are apt to pack too flat, or to have too high ends, necessitating extra cleating, involving bruising. Box packing is an art but slowly learned.



Three tier (54), 4 tier (112), 3½ tier (72). Apples packed on their sides. Three tier mean three rows across the box and three deep. 3 x 3 x 6 = 54. Four tier means four rows across the box and four deep. 4 x 4 x 7 = 112. Three and one-half tier means a diagonal pack.



Three and one-half (104 and 96) and 4 (96) tier boxes. Two boxes packed on sides are on stem end, calyx being up.

Three and one-half tier (80) box. The diagonal or diamond pack (side pack).

Four lithopaths used on Hood River apple boxes. The number of apples contained are stamped on one end of the box, the variety and the registered number of both grower and packer. The advertising lithograph is affixed to the other side.

packs carefully, and that is all that is needed. The buyers, however, do not feel that way. They seek uniformity and not the diversity of views as they obtain among thousands of different orchardists. They want responsible parties who stand back of the grading and packing. Vermont farmers have become entirely accustomed to the grading and packing of dairy products by experts. What is the Babcock test but a device for the grading of milk and cream? Who is the creamery butter maker but the agent of a co-operative or a proprietary creamery, who makes and packs a more uniform product than could the multitudinous individual makers?

Let us state these two propositions in parallel columns:

The dairyman	The orchardist
makes milk which is graded (Babcock) and made up and packed at a co-operative creamery.	grows apples which are graded (sorted into qualities) and packed at a co-operative fruit growers' union.

The creamery was looked at with suspicion at the outset. It is today an accepted fact and a great blessing. And, similarly the centralized grading and packing system in orcharding, an accepted fact and a successful means of making sales in the West, sooner or later must be adopted in the East.

5. *The attractive and uniform packing.* An hour or more was spent, at the railroad and Columbia River shipping point, in the grading and packing house of the union, a specially built brick structure with ample facilities for storage, for refrigeration, etc. The packing is done quite commonly on the individual farms and at local storage houses, but much is also done at this shipping house. The shipments of the higher grades, the only ones on which the name Hood River is used, are made entirely in boxes that are well built, lined, and on which attractive lithographs are pasted, advertising their contents. Several different packs are employed. The straight and diagonal are the most common. Boxes thus packed with shining fruit are among the most beautiful sights that can be conceived. The old proverb mentions the likeness of peas, "as nearly alike as two peas." One looks at the 20 to 24 apples on the surface of the handsomely packed boxes of Newtons or Spitzenburgs, and can see almost absolutely no difference between them, each round, smooth, high colored, and tempting. The details of the packing are nothing which the writer desires to enter upon as the next speaker is specifically to discuss this matter. However, through the courtesy of the Director of the Oregon Experiment Station, he is permitted to use several cuts owned by that institution and used in its bulletins, illustrating methods of packing. It should be clearly understood that apple packing is an art; that initial attempts are usually failures; and that, as in most lines of human endeavor, practice makes perfect. There is this

much to be said, however, that packing in boxes is only to be advised in the East for the extreme fancy fruit; yet it is significant that the apple which has taken the lead in the fancy trade of our Eastern markets, the Oregon apple, is entirely box packed.

6. *An intelligent advertising campaign.* The Northwest is making much of the apple. It started later than did the Southwest in its campaign for the citrus fruits, but its aim is as completely to cover the apple market as California has covered the orange market. To that end it has pursued a wide and intelligent advertising campaign. Within a few days President Taft opened the National Apple Show by pressing a button at some point in the East, which set into motion some machinery—whether an apple corer or something else, the writer knows not. The National Apple Show is not held in the East or in the Middle West, but in the apple region of the Northwest, at Spokane, Washington. The Northwestern apples are advertised, it is said and I think truly, in every country of the globe which buys apples. Their selling agents are located throughout the apple buying sections of the world. It is not only the Hood River people who have a union, but so do the North Yakima, the Wenatchee and a dozen others; and, as I understand it, all these separate unions in a way club together in the matter of foreign advertising and to some extent in domestic advertising. It is the co-operative spirit, the pull-together spirit, the sinking of petty jealousies and of personal predilections, it is what I may call the spirit of horticulture militant, together with the employment of modern business methods and the thoroughly good sales product which they have in the highly tinted, fine flavored, well packed apples, which have made Hood River and its neighbors a power in the apple world. Can not New England apple growers, to some extent at any rate, take to heart some of these lessons and profit thereby? The New England fruit show has shown to the general public what many have hitherto known, that good fruit can be grown here. Is it not worth while to grow more such fruit and is not co-operative community action an important means to that end?

DESIRABILITY OF GREATER UNIFORMITY IN APPLE PACKING AND PACKAGES.

T. L. KINNEY, SOUTH HERO, VERMONT.

I have been listening to all these talks here and found them instructive and interesting. Of course you can't expect me to say very much on packing in packages till I get warmed up in some way, but this matter of beautifying the State of Vermont for the purpose of bringing people here is just as largely due to the efforts of the horticulturists as to any other clan of people, and it is just as much to their interest to make the country of Vermont attractive by nice, beautiful orchards and hotels and camping arrangements as for anybody else. There is nothing that will make the hillsides and valleys of Vermont more attractive than beautiful orchards. Just think of it for a moment, it is beautiful in the winter time with the limbs covered with snow, and the orchards are there permanently. In the springtime it is a fine sight when the bloom comes out, and later on they are covered with green foliage, and still later, the beautiful fruit.

Now for uniformity in packages. The commercial interests on horticulture are the great interests of the day. We are not thinking of it as we did 20 or 30 years ago, when they told us in Grand Isle county of an individual exhibit of 50 or 100 varieties; a farmer could do it at that time, and today they cannot do it. Perhaps today you could find 20 or 30.

One very important thing that attracted our attention in Boston was to see not the great number of varieties, but the great number of single varieties. Nearly 100 plates of Baldwins were exhibited and the committee had to decide which was the best. Then Spys and other varieties were considered; but the varieties numbered very few. Our president told you yesterday something about how many varieties there were that were subject to a premium, so we are getting down to the commericial point.

We are shipping today apples from Vermont in carloads and it is very important for us to consider the package and the packing. The best package for the Vermont apple, the best package every way, is the barrel, but that is not going to suit the professional buyer, still it is distinctly the best package because the barrel will stand more abuse, it is built to,—with the staves and the bulge held in by heads. If the barrel is dropped there is a spring to it and the apples don't get damaged A box must not be dropped. In talking on this subject, a few years ago, I was

called on to help out a dealer in Boston and he asked if I had found why the commercial man in the cities stood up for the barrel, and I told him it was because they could turn the barrel on its side and roll it, but the boxes, they had to carry. Another reason, if we are going to put apples into a barrel we can move them with one movement. Then again the apples that go into the city of Boston in barrels are never used by the consumer in that way. The professional men will tell you that a box is convenient because the consumer can take the box and set it out of the way, but they never do it for the housewife does not take her apples in boxes or barrels either. She always depends on her grocer to bring them, a few at a time, and she never thinks of bringing them into her house in quantity. The grocers had rather have those apples in a barrel because they can take out a peck at a time and take them where they want them. Then there is another proposition that comes to the farmers, that is the fruit-growing farmers, if we are going to pack up 20 or 100 barrels or boxes of apples.

If we pack them in a barrel we have a little, small space for the facers (the facers must be perfect). Let me illustrate: we had a plate of Greenings down at the exhibition and thought we had the best Greenings there; we know that we have over there in Grand Isle county the best location for growing Greenings, and we showed ours with a great deal of confidence. We put them on a table with about 25 other plates and every time that I looked at the plates I decided that ours were the best, but after the judge had passed we found no label on our plate. I couldn't understand this, but this expert detected something that I could not. He found that there had been a codling moth in one of those Greenings and you could stick a pencil right in, but I didn't think that was just, as our plate was so much better than the rest. On that plate we had to accept a third or fourth premium on account of this damage. I called one of the experts and told him that our plate ought to have first premium and he agreed that it was the nicest plate there, and the last one that I showed it to said that the worm hole in the apple was what decided it with the judges. Now with a barrel of apples for sale in a commission house, when the purchaser comes along and looks at the face end of that barrel, he picks out one that is not perfect and takes that as an excuse to beat down the price. We have a barrel of Spies here put up by Mrs. Allen, of Grand Isle, with only 21 apples in the face end. If you have a box you have got to have perfect apples for three sets of facers where you need only one in a barrel. So for these reasons, I say the barrel is the best.

Now what about the barreling proposition? A few years ago a farmer could get very readily 100 or 1,000. The flour barrel is the best on the market so far as the mechanical work is concerned. Now, you cannot get any barrels, the flour is all shipped in sacks. The only way for us is to secure barrel stock and coop shop and tools, etc., and make our own. Buy your barrel stock

by the carload, your staves, heads, and hoops. If you buy for a community you can get two or three carloads of each. It is very cheap getting up a barrel this way. Then have the barrels made to suit yourselves. We have made barrels ourselves and this year we hired a cooper who could put up 100 barrels a day, and he didn't claim to be much of a cooper, but I could have those barrels put up just as I wanted them. The bulge hoops should be just so far from the top and should be even and well nailed and not left up too high, but so that the top will come down just far enough so that they are even and nice.

Those boxes that I brought here were packed in a few minutes. I got the boxes and they are rough. There were a great many boxes at the exhibition, some all covered with paper and fixed up in every way and form. Now uniformity is what we want. Every man is going to pack in the same way after a few exhibits. These boxes here are 20 x 11 x 10. There is something in giving your order for the goods in the knock-down for the boxes will differ in shape. These are the inside measurements. The boxes should be made with good ends, solid enough to hold a nail. If of two pieces, they should be glued together, and then in a box factory in cutting out those sets they will have them glued together. Have the wide side against the narrow side of the end. The ends of the boxes should be heavy, perhaps seven-eighths of an inch, the sides should be thick, but there should be thin tops and bottoms. The boxes should be set on a frame and when you press down the sets you want to press them until the top and bottom spread. The top and bottom never should be nailed onto the sides, but at the ends so that they can spring in the middle. Some of these boxes may have been full when they left home, but now they have lowered. The boxes should bulge when packed so that when opened, the fruit will be above the top of the box. Then there should be cleats across the bottom of the boxes so that when piled, the boxes will not come together. In shipping individual boxes, very often they will get jammed by dropping the side of the box onto something, but in shipping in carload lots from the West, we have no trouble of this kind because we place them in the car with these cleats opposite each other so that they cannot touch. But there is a way to handle boxes so that there is no trouble about bruising.

I prefer the barrel, but the boxes have come to stay and we have got to adopt them. The time is coming when No. 2 apples are going into boxes just as much as No. 1s. Let us get ready for it. Let every man who has 25 or 100,000 barrels of apples get a good supply of material on hand. Then learn to make them.

Now in packing boxes there is no required or standard rule, there was not at the Fruit Show. The facing must be full of apples and you can do it; in packing in layers it is a very simple thing after you once learn it.

There never was a time in the history of the State of Vermont when there were so many seekers for land for setting fruit as there is today. Since that exhibition I had 45 letters one day from different parts of the country asking about the possibilities of the State, the parts that were suitable for setting orchards. It is wonderful! These are not from men who are going to work the farms themselves, but who want them for commercial reasons. There are so many reasons why they are setting them, they think there is a profit and pleasure, and a possibility of accomplishing something here in New England. The time has gone past when we have got to go off in the dry sand of the Pacific coast and make money in an orchard; you can do it right here in New England. We are going to see more commercial orchards. All through the State there is that reaction. Here is a point for us to consider, the bringing of people into our State for commercial purposes.

Mr. Hale, in his address before the Chamber of Commerce, gave us a wonderful entertainment. There never has been a time in the history of old New England, when the city people would entertain the country people as they do today. The farmers were taken into their nice club rooms during the Fruit show, and the last Monday evening I was in Boston this fall, I was invited to a church club. How has this all come about? It has come about because the country people have been entertaining the city people for years, and today we want the city people to come. The subject of education was discussed in this church club meeting and they told all about the education of the towns and cities in New England, and what progress had been made. How is it in the rural districts of Vermont? Are the school houses any better than 50 years ago? No, they are not as good. People out in the country are gaining a wonderful amount of knowledge from just what is seen of the city people. Why it is that country boys are employed in the city when the city boys are turned away? If there is any manual labor about the place the country boy is going to get the call. This is on account of the bringing up they have had. They are observing; they learn quickly; they are more intelligent than the boys in the city; they are using better language than they used to years ago; when they go to the city they know better how to appear. It is difficult to pick out the city boy from the country boy. You cannot educate the city boy without having his influences spread out into the country. This great fair that has just been held never would have taken place if it had not been for bringing together the city and country in that Governor's Meeting a few years ago, so we want to bring into our horticultural work all these matters of education. We know whether orcharding does pay or does not. Some of our dairymen are beginning to think that they are paying out about as much as they are receiving. How much land is there in Vermont that is fit to set to apple trees? We must learn all these things and make more progress than we have ever made before.

DISCUSSION.

MR. WRIGHT: Why do you face apple barrels?

KINNEY: We face apple barrels for the first impression that the customer gets. If you go into a store where there are a lot of barrels your attention is attracted to the best looking ones. When the professional apple buyer sees a barrel of apples that attracts his attention, he stops there. We do it to attract attention.

MR. WRIGHT: Isn't that the best argument in the world for facing boxes? They are faced clear to the bottom, not only on top. Your barrels never are.

PRESIDENT PERRY: I understand that in Canada the law does allow ten percent if two faces are shown.

PROFESSOR HILLS: Might not some people misinterpret Mr. Kinney's advice to put their very best apples on the top and the poorer ones below? As I understand Mr. Kinney, he means to put the best apples in such a position that they will attract attention.

MR. WRIGHT: Mr. Kinney said that Grand Isle county was the best place to raise apples. He didn't get the first premium at this show. If he had made that a little broader and said the Champlain Valley was the best, I should not take any exceptions to his statement.

In regard to package, he holds the barrel to be the thing.

MR. WRIGHT: I agree that the box package is the thing because it is going to encourage the raising of strictly fancy fruit. We had our trees low headed and got an immense quantity of green fruit off our lower limbs because the trees were too low. We got our nice fruit from the top of the trees. The barrel is the package that we use to-day on our farm. We sell our fruit to a New York firm and this is the manner in which they asked us to put up our fruit. They want the best apples in the barrel in the first two rows. Back of those they want some pretty good apples; if you have any green fruit they want it in the center of the barrel, but they want a pretty fair grade to finish off with. If you are going to pack them in boxes you could not get more than one-half of our regular barrels that would be fit to pack in boxes, and what would we do with the other half? We would have to send those to a canning factory or an evaporator. That is why I contend that the box package *is the package* because it is going to encourage the thinning of some of their fruit.

When we get down to the desirability of greater uniformity in packing for Vermont we have got to deal with the Vermont farmers. The old farmers are the poorest, intellectually, of the whole New England stock. Years ago, when this country was new, the son of a farmer who had enterprise, just pointed his face toward the setting sun and went just as far west as the edge of

civilization. That is what makes the West to-day what it is, it is the energy and enterprise of New England. The young fellow in New England years ago, of no enterprise, stayed at home and did what his father and grandfather did. Now there are three classes of people that would be benefited by greater uniformity of packing, the consumer, the dealer and the grower. The consumer demands and advocates the idea that we should pack our apples better. He would be greatly benefited and so would the dealer, but when you get right down to the grower he does not think that he is going to be benefited. A good many of them never saw a Western package of apples in their lives.

Until three years ago the fruit that was shown at the meetings of the Vermont State Horticultural Society was pretty poor stuff. Since that time when some people from Addison county came up here and showed you what good fruit was, you have had to bring better fruit. How are we going to get these growers together? I have found that the Vermont farmers are pretty hard men to get to pull together; you cannot convince them of anything. There is just one way and that is to make them do it by State law, and I don't see any salvation for the fruit growers of the State so far as the advancement of the apple industry and the idea of growing our apples are concerned, except packing them as they should be. I don't see any way out of it but that the State of Vermont has got to take the matter in its hands and say you have got to do so and so.

MR. KINNEY: It is a fact that two localities in the State of Vermont are going to butt together pretty hard, and those are Addison county and Grand Isle county. Mr. Wright asks, "What are we going to do to get the farmers together." We went down into the Champlain Valley and formed an organization there at the time of the Tercentenary celebration and started this Champlain Valley Association. It is incorporated under the laws of the State of New York and the officers have been elected and we have the Pure Food Law at our hand; we have our serial numbers and are permitted to put our apples upon the market substantiated by this incorporated body under the laws of the State of New York, backed up by the serial number. It is the greatest thing that the Champlain Valley ever brought before the State of Vermont.

MR. WRIGHT: One reason why I didn't join the organization in the northern part of the Valley was because we hoped to have one in Addison county, but the main reason was that practically all the fruit from that section goes down to one firm in New York City. As yet, we, as farmers, are not producing enough apples to handle them ourselves. We sell them to E. P. Loomis & Co., and they want simply Loomis's mark put on the barrels, and under those conditions I didn't think it was best that I should join this Association in the northern part of the Valley.

MR. HILL: There is just one thing that I want to touch on, and that is that it is all well enough for our experts who pack

in boxes for fancy trade to do so, but in the first place you have got to have fancy stock. It is a good thing for a man to get away from home and find out what is going on about him. I am in the apple business and want to stay in it, but a few years ago I thought I would like to know something about the selling end of it by confining my attention wholly to the growing of apples; I wanted to know what the market must be as well, so I spent about three years at the New York end of the line to find out what the market wants and I found out some things. In the first place, Vermont has been sending apples to the market for somewhere near a hundred years and they have always gone in flour barrels. I think the flour barrel is the best package for the average Vermont farmer. Why? A man told me recently that he would give me half a dollar more for my apples if I would pack them in flour barrels. Why haven't we done it? It has been a proposition to gather enough flour barrels and use them without expense or loss. If I sent for five hundred barrels at twenty-five cents a barrel to be delivered on board the cars, when I got my barrels home I had fifteen or twenty salt barrels, twenty-five or thirty sugar barrels and twenty-five or thirty barrels without heads or hoops. They cost me, when I figured up the expense of freight and loss, somewhere in the neighborhood of fifty or sixty cents.

Then the labor of coopering up these barrels after they were filled, added to the cost. I have found that there is a firm which makes a business of coopering these old barrels, matching up the heads and putting on the hoops and will sell them at about the cost of a new barrel on the market, and I intend another year to lay in a stock of those old flour barrels simply for the reason that the new barrel package will not command the price on the market that the old flour barrel will. It is a singular fact that most of the buyers on the market are either Jews or Italians, and you can talk to those fellows until you are black in the face if you have box packages that come from Vermont and they won't believe you, but if you have them in flour barrels, you won't have to do any talking. Then I found out another thing, that the Vermont apples have a flavor that is distinctly their own, and some people are willing to pay for that additional flavor. A firm that I was with three years ago found it profitable to take California Pippins, shipped in boxes, pack them in barrels and ship them to the other side. Why? Because they would bring more money over there and the consumer had learned that Eastern fruit was packed in barrels and that Western fruit was packed in boxes. Vermonters have already got an established reputation for barrelled fruit; let them stick to it.

As for trying to regulate this by legislation, I am in favor of any regulation that will compel honest packing. I would like to have the State of Vermont pass a law that would compel every fruit grower to grade number one apples.

PRESIDENT PERRY: I have been thinking, ever since the New England Show, that in this apple business we are losing sight entirely of the fact that if we proceed very much further in the way we are going, the poor people of the cities will never see an apple because they can't afford to buy this fancy fruit; they can't afford to buy any such fruit as is displayed here to-day, and they need apples for cooking and eating purposes, and, although it is very well to say that we do not want to put this fruit into the market because it spoils the market, I tell you that the poor people will be glad to get some of those apples, and they are worth a good deal more that way than canned or made into cider jelly or anything else, and it seems to me that the solution is to put the fancy apples into the boxes and the other grades into the barrels and let the grocers sell them out by the peck.

PROFESSOR HILLS: May I say that this is just what is done in Hood River. What is sent East is packed in boxes, but what they sell out there goes to Portland and Seattle in barrels and they told me in Portland that it was much more difficult to get fine apples in barrels than in boxes.

PRESIDENT PERRY: I want to say that it is the opinion of those of us who have been to quite a number of sessions of this society during the past six or seven years, that we came up to the town of Newport with a great many misgivings and were afraid that we would have a very poor meeting, but it is the opinion of every one of us that this is by far the most interesting and profitable and enthusiastic meeting that the society has ever held.

An invitation was extended by Professor Gulley to attend the meetings of the Connecticut Pomological Society which are held in February of each year, at Hartford.

BUSINESS SESSION.

REPORT OF SECRETARY.

M. B. CUMMINGS.

Your present secretary has been in office about three months. During this time chief attention has been given to the preparation for this meeting, and the result of such attention is the program which is now in your hands.

The New England Fruit Exhibition, which was held in Boston October 19-24, was a great success. Vermont sent some choice fruit to the Exhibition and the quality and appearance of it was so good that nineteen prizes (10 first, 6 second, 2 third and 1 fourth) were awarded to members of our society. Your secretary was proud of the showing made by Vermont, and he wishes to extend his appreciation of the efforts of Messrs. Perry, Kinney and Halladay. Much credit is also due Prof. William Stuart for his interest in the show and his early solicitation of funds for the exhibit. The expense of the Vermont exhibit was financed through the solicitation of subscriptions from public spirited men like Gov. Prouty, Hon. Fletcher Proctor, Hon. William Evarts and others.

The New England Fruit Show was another demonstration of the possibilities of successful fruit culture in Vermont as well as elsewhere. But greater opportunities and still finer products will be possible if this society takes a larger part in the development of horticulture in Vermont.

Your secretary wishes to urge consideration of three things for the betterment of horticulture in Vermont. These are: an increased membership in this society, an increase in State appropriations for Society work, and thirdly, an annual summer meeting. A word may be said about each of these.

First, the membership of this Society should be greatly increased. We have at present 109 names on our list. This number can be doubled in one year and might be tripled in three years. It is safe to say that only a small fraction of the fruit, flower and vegetable growers in Vermont are members of this Society. Many do not realize the advantages and usefulness of this Society, and still others have not been asked to join. New members mean new life, more interest and greater enthusiasm. We

need more members and earnest efforts should be made to get them.

Second, our funds are insufficient. Our premium lists are still too small. Large premiums are needed to insure good exhibits. With a little more money better programs could be provided, and a larger attendance could be secured. We ought to reach more people. An increased appropriation would greatly increase the possibilities and usefulness of this Society.

Third, a summer meeting is exceedingly desirable. We should have field meetings in orchard, nursery and garden. We need to study not merely *fruits*, but fruit plants; not merely plant products, but *producing agents*. Methods of fighting insects and means of controlling fungous diseases, and better methods of orchard management are worthy of more careful study. These things are most instructive when *seen* outdoors and while in progress, rather than *heard* from the platform. A field meeting which will combine demonstration and lectures is well worth while. It would be a step in the right direction. I urge this point as a matter of great importance.

If we can realize these three things: more members, more money, and more meetings, I can predict a greater *usefulness* for this Society, and a greater horticultural industry for Vermont.

REPORT OF TREASURER.

VERMONT STATE HORTICULTURAL SOCIETY.

EXPENDITURES.

Printing.

1908.		Warrant No.	
Nov.	6.	179—Sheldon Press, Program and premium cards	$ 10.60
		233—Capital City Press, entry cards	1.75
	30.	213—Free Press Association certificate award	1.75
Feb.	6.	228—Sheldon Press, letterheads	1.75

June 21.	234—Free Press Association, envelopes	$ 1.25		
Aug. 20.	235—Sheldon Press, circular letters	4.45		
	233—Capital City Press for 300 reports	56.00		
			$	77.55

Premiums.

Nov. 14.	196—T. L. Kinney	$ 3.50		
	197—Mrs. H. D. Allen	.50		
	198—W. N. Phelps	3.50		
	199—A. T. Clark	2.00		
	200—L. H. Sheldon	3.00		
	201—L. &. L. Motte Home	.50		
	202—D. T. Trombly	35.00		
	203—W. C. Holcomb	10.50		
	204—A. A. Hill	8.00		
	205—A. M. Vaughan	1.50		
	206—G. H. Wright & Sons	6.50		
	207—C. V. Ormsbee	1.00		
	195—Luther Putnam	25.00		
	208—Montpelier Greenhouse	8.00		
			$	108.50

Hotel Bill of Lectures.

	184–189—Pavilion Hotel	$ 28.50		
	218—Hall rent, W. A. Pattee	32.50		
	219—Stenographer, J. H. Minns	35.55		
	230—Miss S. A. Nott	2.50		
			$	99.05

Lecturer's Bills.

1908.				
Nov. 3.	182—E. D. Sanderson	$ 14.00		
	192—H. W. Collingwood	29.15		
	212—U. P. Hedrick, expenses	32.50		
	221—U. P. Hedrick, 2 lectures	25.00		
	216—J. H. Hale, lecture and expenses	44.70		
28.	226—Lantern, A. C. Brown	3.00		
				$148.35

Paid Officers.

Oct. 31.	Wm. Stuart, secretary.....	$ 9.63	
Nov. 9.	190—Wm. Stuart, salary and expenses to meeting...........	62.14	
	191—R. E. Vaughan, expenses assisting secretary............	1.64	
	193—G. W. Perry..............	16.09	
	194—G. H. Terrill..............	4.25	
	209—F. E. Foote...............	8.41	
	210—T. L. Kinney.............	3.32	
	211—D. T. Trombly............	12.46	
	214—E. L. Wright.............	3.46	
	215—L. H. Sheldon.............	13.10	
	217—W. E. Robinson...........	11.08	
	220—A. M. Vaughan............	5.78	
	222—E. S. Brigham............	9.31	
	225—G. W. Perry..............	5.55	
	227—E. L. Wright.............	2.15	
	229—A. A. Halladay............	5.80	
	231—G. W. Perry, N. E. Fruit Show Travel, &c.	8.06	
1909.			
	238—G. W. Perry..............	8.05	
Sept. 1.	236—Wm. Stuart, salary and expenses....................	33.61	
Nov. 13.	240—M. B. Cummings		

Postage	$5.38	Programs	$ 4.85
Telephone	.60	Entry cards	1.40
		Posters	1.50
Letter paper	1.35	Stenographer	2.40
	$7.33		$10.15

		$ 17.48	
			$ 241.37
Nov. 14.	239—G. W. Perry, N. E. Fruit Show expenses...............	$149.58	
			$ 149.58
	Total expenditures................		$ 824.40

RECEIPTS.

1908.		
	—Cash on hand.............	$400.16
Nov.	10—Received for annual dues.........	37.00
	—Sale of chrysanthemums..........	22.88

1909.				
Jan.	25—State appropriation..............		$500.00	
Aug.	16—Annual dues....................		26.50	
Aug.	21—Gifts to further N. E. Fruit Show			
	G. H. Prouty.............	$ 50.00		
	F. D. Proctor.............	25.00		
	Maxwell Evarts...........	25.00		
	C. S. Page................	10.00		
	W. P. Dillingham...........	10.00		
	C. C. Fitts.................	10.00		
	Olin Merrill..............	10.00		
	C. P. Smith..............	10.00		
		$150.00	150.00	
Nov.	13.—Annual dues...........		2.00	
				$1,138.54
				824.40
	Balance, Nov. 15, 1909.............			$ 314.14

A. M. VAUGHAN, Treasurer.

I have examined the above report and find the same to be correct.

H. KIBBIE BROOKS, Auditor.

Nov. 18, 1909.

REPORT OF COUNTY VICE-PRESIDENTS.

ADDISON COUNTY.

E. L. WRIGHT, MIDDLEBURY, VERMONT.

It gives me great pleasure to come to Newport at this time for several reasons. First, it gives me an opportunity to rub up against my friends in the northern part of the Valley—Brothers Trombley, Holcomb and Kinney—in the exhibition of Vermont grown fruit. But most of all it gives me another opportunity to tell you of things relative to horticulture in Addison county. There is a constantly increasing desire on the part of Addison County men to know more about the proper methods of orchard management, though there are not many of those men present at this meeting. I have endeavored to get more of them, but it is hard for most of them to get away. The fruit grower in Addison County has too many cows to leave for three or four days. And he still is of the opinion that he cannot live without them. For

my part I don't like to live with them. It's not always the cows though, sometimes it's other business. Take Mr. Hemenway, for example, he is away from home over in the Connecticut Valley buying apples and has his son with him. And while I am mentioning Mr. Hemenway I want to make a few statements about his son, Lee. He has left school, for the present anyway, and is at home with his father. I believe he will eventually take over the orchard management as he is working along that line now. He took the ten weeks' course at Amherst last winter. I think he is going to be another enthusiast of fruit growing and I believe you will hear something good from him before many years. Mr. Hemenway sent his membership fee by me as he said it was doubtful if he or Lee could come.

Another man down there you are going to hear from soon is Brother A. T. Clark of Addison. He is getting warmed up all right. He is doing better than the others for he is making the effort to not only attend but bring some fruit along with him. I believe Mr. Clark is here somewhere to-day. Then there is F. E. Foot, who always remembers us with a telegram if he cannot come.

There were not many new orchards set last year. It required a great many trees to fill vacancies caused by the severe drouth of the season before. I believe those who are setting orchards are taking better care of them than they did a few years ago. They know more about proper methods of growing young trees. I am saying this about others, not our own firm, because my father still holds the whip hand on the farm, although he lets me hold the reins. I have tried for three successive years to make a deal with him so I could devote my whole time to the production of fruit, but he won't give it to me. He still maintains that you have got to have the cows to keep the orchard up, which is more or less all bosh. Since I have been at home the orchards have seen little stable manure; it takes all the cow manure to raise corn to fill the silo to feed the cows to make more manure to raise more corn to fill the silo, etc., to the end of the dairyman's career. One of the last things our men did last week was to clean out all the hog pens and yards and spread the refuse on the ground where those Spys and Baldwins were raised. That is not all the trees have got either, as nine pigs have run in the lot all summer. In a part of this orchard is a mixed growth of clover and alfalfa which the pigs are very fond of.

The apple crop in our section was even smaller this year than last, some estimates being as low as 8 percent. Certainly it has been years since so few have been shipped from Middlebury. At Bristol very poor natives are selling at 25 cents per peck to-day and a good barrel of Spys would bring $5 quick. I don't know what a box or a barrel like these on exhibition here would bring. Very probably $3 per box or $8 or $10 per barrel, or would retail for five or ten cents apiece.

There are hundreds of acres in Addison county that should be set out to trees in the next five years. I say this because real estate is going up there by leaps and bounds. One farm which was bargained for two years ago was finally held by the owner and sold last spring for $1,000 more than he asked for it two years ago, and this same man bought another farm at an advance of $1,000. It is getting to be quite the thing to buy a run-down place, fix it a little, sell it for several hundred more than it cost and then repeat the performance on another place. One place near Middlebury was bought a number of years ago for about $1,000. The man and his family have fixed it up at odd times and to-day they have refused $1,800, which is much in excess of its original cost. I mention these facts to show you that while today good orchard land can be bought there from $20 an acre up, it will cost double that in a few years. We have a 65 acre block that we have at different times thought of selling, but now it is not for sale and we are putting out apple trees on all of it that is suitable, some 30 or 40 acres eventually. There are several hundred acres adjoining this property that cannot be beaten for the production of Spys, Baldwins, McIntosh and Greenings. Why some of this land on the S. W. Jewetts & Sons' farm is cutting three crops of alfalfa a year. You cannot tell that firm that alfalfa will not grow in Vermont. They have some fine Anjou pears almost every year. They have a hundred acres of fine fruit land, but, alas, again it is a dairy.

Addison county has enough dairymen, enough horsemen, enough sheepmen, but it needs more fruit men. Men who "know how." It's the "know how" that counts in producing a good product. And it requires a large measure of faith and confidence in one's self to use this knowledge, whether one is producing fruit or Morgan horses.

FRANKLIN COUNTY.

H. K. BROOKS, SWANTON, VERMONT.

The past year has been an adverse one to the growth of most horticultural products. The spring season was late in opening and was attended by a great deal of cold, wet weather. However, we stood in need of much rain to wet up the ground, for the season we were emerging from had been terribly droughty. Lack of fall rains had left the ground very hard and dry, and during the

winter, frost scarcely penetrated the ground. Gradually it grew warmer and horticulturally it was very "flowery." When summer came, dry weather came also and this was damaging to the growth of all crops.

Apples. I speak of this crop first for alphabetical reasons and not because the crop is first in size or importance in the county. The apple crop is very small in Franklin county this year, probably, if evenly distributed throughout the various towns in the county, there would not be enough to supply the local demand. What few apples there were, were well-colored. Conditions were good for this, for there was but little cloudy weather during the growing season. I believe insect pests were perhaps a little more prevalent than usual, especially the leaf-eating insects. Fruit dealers and retailers are paying about $4.00 per barrel for McIntosh Reds and like varieties.

Potatoes. This year's crop was planted a little later than usual on account of the lateness of the spring and the wet weather. The last of June, all of July and the first of August was terribly dry, and the promise of an average crop seemed to be exceedingly vague. It seemed to be an excellent season to show what thorough cultivation and spraying would do. In several instances where this was neglected, the vines were dead before the rains came in August which insured a crop to those who had kept their plants in a healthy condition.

Late digging seemed to be the order for no frosts occurred of any consequence prior to October 20, when we had quite a stiff freeze which laid the vines low. In some places away from the lake and on low land, a little frost came the very last of August and again the first of September, but it was of little consequence, though I hear that in some parts of the State considerable damage was done.

We harvested a larger crop of potatoes in Franklin county than we have for several years. Those who grew early potatoes for the first market did exceedingly well, for few were sold for less than $1.00 per bushel. Late potatoes sold in small quantities in the beginning for 50 cents, but I know of no cars being loaded at more than 40 cents.

Truck crops are yielding an average in quantity and quality.

Spraying to control fungous diseases and insect pests is increasing. Arsenate of lead is becoming a great favorite as an insecticide on account of its holding so well to vines and foliage, and again there is no burning as with Paris Green.

GRAND ISLE COUNTY.

D. T. TROMBLEY, ISLE LA MOTTE, VERMONT.

The blossoming period of the season just passed, was about 10 or 15 days later than usual. Although the trees blossomed full, the apple crop was very light, yielding only 20 or 25 percent of that of a normal season. The crop was sold for about $3 for ones.

Many trees are dying, and among these the most important are Ben Davis, Baldwin and Bellflower. The cause of death of these trees is not definitely known but is assumed to be a combination of dry summers and cold winters.

The growers in Grand Isle county are better off financially than they ever were before. In spite of the fact that many of the trees have died out, the total acreage has been gradually on the increase because of the large plantings during the last ten or fifteen years.

The varieties now most used for planting are McIntosh and Snow, both of which are very hardy and very productive here. In recent years these varieties have not suffered by drouth or cold as have most of our commercial sorts.

There seems to be considerable difficulty in controlling the various diseases of the apple, particularly the curculio, codling moth, and aphis. This last year, in fact the past two years, have shown a good deal of injury from aphis, a trouble which is ascribed to these insects by the symptoms of the fruit, which grows in clusters and fails to develop. Fruits are almost always lop-sided and out of shape.

ORANGE COUNTY.

DANA H. MORSE, BRATTLEBORO, VERMONT.

Although Orange County is not a great horticultural producing locality, yet no casual observer can fail to see that thrift and interest in this industry is steadily on the increase.

Some of our most thrifty and thoughtful farmers are planting small new orchards, while others are taking better care of their

older ones by adopting newer and better methods, such as spraying, pruning, fertilizing, cultivating, etc.

While it has been a poor apple year in most parts of our county amounting to almost a failure in some localities, yet there are some who have realized a handsome profit from their small orchards and I cannot recall to mind any single year when so much money has been paid the farmers of Randolph, Brookfield and Braintree for their apples as the present one.

Something over twenty carloads of apples have been shipped from Randolph this year, ranging in price from two to three dollars per barrel, besides several shipments of cider apples, which argues well for thrift and increased interest in the industry.

More noticeable, too, is the increased interest in growing of small fruits both for home use and the markets. On the east side of the county, along the Connecticut River, some farmers are growing strawberries to the extent that they are selling annually enough of the delicious fruit to equal the selling value of their farm.

Hence the conclusion that under good and judicious management of our horticultural industries we may hopefully look for better days and brighter visions to dawn upon us.

RUTLAND COUNTY.

D. C. HICKS, NO. CLARENDON, VERMONT.

There has been no very marked change in the conditions in this county since my last report. Fruit crops, as a rule, have been below a ten-year average. In strawberries the yield was very uneven, some fields picking good crops, others very light yields; demand and prices were good. The same conditions may be said to have obtained with the raspberry crop. Currants and blackberries made good average crops, with satisfactory prices. Fays and the new Perfection are the best currants for the commercial grower. The Red Jacket gooseberry made a bountiful crop the present season. I consider this fruit a valuable addition in the home fruit garden, the only objection that can be made to it is its very thorny bush, which makes picking a slow and unpleasant task. The cherry is but little grown in the county; in the few bearing orchards a medium crop was picked and the quality was excellent, demand and prices were good; the difficulty of getting good pickers is a handicap in raising this crop. The use of cherry pickers is coming into favor, and one skilled in its use will pick three bushels in ten hours and

the fruit is in better shape and commands a better price. My best varieties are: Montmorency and German Osthiem.

Plums made the best crop in several years; Lombard, Burbank, Damson and Green Gage bore full crops; Bonnie St. Ann, a plum of the Damson type from Canada, and Tennant Prune, a very large and handsome plum from Oregon, are very promising for trial in the Champlain Valley.

The pear crop was rather uneven; some varieties giving good crops, others not fruiting at all. Perhaps we might rate the crop as an average one; the varieties in my orchard that gave the most fruit were Summer, Doyenne, Gifford, McLaughlin, Grand Isle, Bartlett, and Anjou. Vermont Beauty and Tyson, usually heavy bearers, gave me but little fruit this season. Of the newer varieties, I consider McLaughlin, Worden-Seckle, Columbia (Bartlett X Seckle) and Rossney the best. Lawrence, Winter Nelis, Howell, Bosc and Arnold succeed well in this section of my county.

Apples are the principal fruit crop, and did not give over 30 percent of a ten-year average. The quality of the fruit is better than a year ago and prices are higher in the local markets; the almost universal package is the barrel; a few are beginning to use the bushel box, in every way the most convenient and desirable package for growers and consumers. After mid-winter last season the fruit stores in Rutland had to depend upon boxed fruit from the larger cities, the best of this came from Hood River, Oregon, and sold by the dozen for sixty cents; they were large in size, free from blemishes, high color and from fair to good in quality. I have had samples of McIntosh and Jonathan from the interterminal valleys of Utah, Colorado and Idaho that excelled these Oregon apples in color and quality. Vermonters, and all the rest of New England for that matter, will in the near future have to meet the sharpest kind of competition in our home markets with these Western grown apples;these Western growers are alert and resourceful, and while we have all the natural advantages on our side, soil, climate and nearness to the great markets, yet if we hold our own we must be up and doing. Grow the varieties suited to your locality, using the best methods of cultivation and care; pick, grade and pack as carefully as your competitors; in fact study their methods and there will be nothing to fear. Were I to be asked to name the six most suitable apples to grow in a commercial way in our section of the State, I should name the Northern Spy, Baldwin, Canada Red, Rhode Island Greening, McIntosh and Shiawassee. A new apple from the Middle West bids fair to take a high place among our best dessert apples, this is Opalescent, and it has the same high-class color and quality as McIntosh and Shiawassee, and in addition is a better keeper, tree hardy, a good grower and productive.

Spraying as yet is not general here. The worst fungous disease is canker in the apple. Pear blight and black-knot in plum and cherry are not troublesome where trees are kept growing thrifty and watchful care is taken of them.

WASHINGTON COUNTY.

C. C. ORMSBEE, MONTPELIER, VERMONT.

The fact that Washington County produces any fruit at all is ample evidence that this county possesses unusually favorable natural conditions for fruit growing. Our farmers are too much attached to the Jersey cow to care to engage in any business other than dairying. They are wholly indifferent regarding fruit growing and I see very little prospect for any change in this sentiment. They usually buy two or three trees of the first agent who comes along. They do this to get rid of him and to be able to tell all other agents that they have placed an order for all the nursery stock they care to try. When the trees come they are put in the barn until a convenient opportunity arrives and then, perhaps in two days and perhaps in two weeks, the farmer takes a shovel and digs a hole in his hay field and plants the trees. This is all the care they ever receive. If they live, all right. If they die, he does not care. Some of them do live and eventually bear apples, more or less wormy and scaly. He usually manages to gather most of the fruit, shaking the trees to make it fall to the ground,—if he can,—and if he can't he knocks it off with a pole, often boasting that this is the way he prunes his trees.

In picking he makes two grades, big apples and little apples; keeps what he wants for his own use and sells the remainder for what they will bring. Sometimes he markets them in bushel baskets, sometimes in barrels, sometimes in bran sacks and sometimes in a wagon body, shovelling them up with a scoop shovel. Often he feeds them to his stock and frequently buys good apples for his own use. He also buys considerable quantities of canned and evaporated apples. Washington county imports annually from sixteen to twenty carloads of apples. The farmers all admit that they would make a great deal more money if they followed up-to-date methods, but doubt if there would be any more net profit.

We make no attempt to grow pears or peaches or grapes. Black-knot killed our plum and cherry trees a good many years ago and we have never replanted. Worms killed our currant and gooseberry bushes and we surrendered to the worms.

We grow considerable quantities of blackberries and raspberries. We grow them in the fence corners and back pastures and sometimes we pick some of them, but generally the boys from the village get most of them.

Frequently the farmers set out small strawberry beds but they never take care of them and they never amount to anything. Farmers buy large quantities of berries from the city market rather than grow them and as long as they continue in their present state of mind there is little hope for improvement.

WINDHAM COUNTY.

A. A. HALLADAY, BELLOWS FALLS, VERMONT.

The year of 1909 has been remarkable in some respects. Generally speaking crops have been very good. Strawberries were a wonderful crop; the fruit was large and of fine quality and abundant. Raspberries and blackberries a light crop owing, no doubt, to previous dry seasons. Currants were plentiful and extra fine, and where arsenate of lead was used the previous year there were no currant worms. There was not a single worm found on our entire field of currants during the season.

Of the tree fruits, cherries were a bumper crop and the birds were not quite so troublesome as in some past seasons. Plums were abundant. Apples were, as a rule, a light crop and very poor in quality. This, I believe, is in a large measure owing to poor management of the orchards and the lack of proper spraying.

In our own orchards where spraying is practiced, we have had the largest yield of the finest, most perfect apples we have ever had or that I have ever seen. Our apples were sold to local consumers at prices ranging from five dollars to seven-fifty per barrel, and selling over the restaurant counter here in town at 10 cents each, and the supply was not equal to the demand at these prices. The fruit grower who does not have the time or inclination to spray his orchards should either destroy his trees or dispose of them to some more enterprising person who will spray. Every person who owns an apple tree should spray. We are in favor of growing more and better apples. I cannot endorse the sentiment as expressed by our worthy President, that we should grow more fancy fruit for those who can afford to pay fancy prices for it, and more inferior fruit for the poorer classes of our people. If all the fruit we grow was fancy we could well afford to sell it cheaper so that the poorer people could afford to have good fruit.

In Windham county the deer question is of the most vital importance to not only the fruit grower but to the whole people of the State of Vermont. There is absolutely no encouragement

for the planting of new orchards. Young orchards all over the county are being destroyed by deer, and not ten percent of the actual damage has been paid by the State during the past season. The amount of money paid out to the farmers of the State for damage done by deer is no indication whatever of the real damage actually done to crops and forest trees by these wild animals which are being protected by the State for the sportsmen to murder. $100,000 will not pay for the actual damage to the farmers of the State of Vermont by wild deer during the year of 1909. There are few people in the State, even including the farmers themselves, who have any idea of the actual numbers of deer in Vermont. Last spring my son and others, while out with cameras in a thickly settled farming district, saw 18 deer. Another day they saw 40 deer on less than one acre of land, and at another time they counted 69 and got a photograph of 18 of them. Who are feeding these deer? The farmer who owns the land or the city sportsmen? There is one remedy for this, the gun, and a decision by the Supreme Courts. This deer question must be settled and settled in favor of the farmer before many new apple orchards will be planted in Vermont or before the fruit grower will give his orchard the best care. We cannot grow apples and allow wild deer in the same State at the same time and save our orchards.

WINDSOR COUNTY.

GEORGE W. PERRY, CHESTER DEPOT, VERMONT.

I have very little report to make for Windsor county; with very little exception the report for Washington county would be just right for our county. There is a little section of Windsor county along the Connecticut River where a considerable crop of apples of fair quality is raised, but without any real care or effort. The whole county is an apple country, natural apple land and apple climate, and the finest of fruit could easily be grown upon the hillsides, but it is not done. The apples are picked and marketed just as Mr. Ormsbee has described. But we do raise a lot of things they call apples and ship them by the carload to Boston where they are sold for No. 2s. I don't know of a single apple orchard of any size being set out or having been set out for the past twenty years in that vicinity. So far as I know the farmers are neither building fences nor houses nor painting their buildings,

or doing anything except buying a few cows and shipping their milk to Boston, and spending half a day in taking it to the train. There are woodlands there which cut much timber, and, if it was not for that, they could not get a living. We have occasionally one who makes a business of farming and succeeds, but at the present time a great many of those farms that used to support large families are growing up to timber, and I don't know but that is about as well as you can do with some of them. But still there is an opportunity to raise the finest fruit up there, but they don't grow it. They buy their fruit, even strawberries are shipped in in the strawberry season from New York State to be sold, and squashes and cabbages and turnips are shipped up here just as if we had no land in Vermont.

REPORT OF NOMINATING COMMITTEE.

The report of the committee on nomination was as follows:

For President, George W. Perry, Chester Depot.
Secretary, M. B. Cummings, Burlington.
Ass't Secretary, J. W. Wellington, Burlington.
Treasurer, A. M. Vaughn, Randolph.
Auditor, C. W. Richmond, Newport.

The report of the nomination committee was accepted, and the secretary was instructed to cast a ballot for each officer who had been nominated. At each instance the officers listed above were declared elected.

The executive committee was then elected. President Perry made the suggestion that as far as possible the executive committee be selected from places near Burlington so as to lessen the expense of the executive committee meetings. In view of this suggestion, E. L. Wright, of Middlebury, T. L. Kinney, of South Hero, and E. S. Brigham, of St. Albans were elected to serve with the president and secretary, and to constitute the executive committee.

The appointment of county vice-presidents was left with the president and secretary, and the appointments are listed on the title page of this report.

REPORT OF COMMITTEE OF RESOLUTIONS.

Be It Resolved, That in this, the fifteenth annual session of the Vermont State Horticultural Society, held in Newport, Vermont, the Society is experiencing the new life and enthusiasm so necessary to successful [illegible] therefore be

Be It Further Resolved, That this Society hereby expresses its thanks to His Excellency, Governor Prouty, who has done so much to make this meeting a valuable one to this community and to the Society; to the people of Newport for their hearty welcome and attendance at the various sessions of our meetings; to the several speakers and others who have so generously given their time and services to make these meetings so successful.

Be It Resolved, That the Society hereby tenders its thanks to those who so generously contributed their time, services and money to make the Vermont exhibit at the New England Fruit Show such a decided success, as evidenced in premiums taken. We realize that they encountered many obstacles, but the results they obtained rebound to the credit of this Society and to the fruit interests of the State at large.

Be It Resolved, That copies of the Annual Report be sent by the Secretary to the speakers at the meeting.

Be It Resolved, That the Society hereby expresses its appreciation of the long services of our past secretary, Professor William Stuart, whose untiring efforts did so much for the good of this Society. His preferment we rejoice in, and we extend to him our best wishes for his continued success.

Be It Resolved, That it is the desire of this Society to further increase its membership, and to this end we extend a cordial invitation to all to become members.

Respectfully submitted,

H. KIBBIE BROOKS
W. E. ROBINSON
Committee.

DISCUSSION OF THE VERMONT HORTICULTURAL SOCIETY RELATING TO THE DESIRABILITY OF HAVING AN ANNUAL REPORT ON VERMONT PRODUCTS.

MR. HILL: I would like to bring up one point in the way of making an annual agricultural report covering potatoes, apples, or any other subject that the Vermont farmer is interested in. More should be known of the apple crop, so that those who are interested in the growing of apples can get something of an idea as to what the apple crop is in this State. The information that we now get is from the National League of Commission Merchants, whose business it is to send out reports of the apple crop throughout the United States. Somehow our crop report for the past three or four years has been way above the actual yield as determined by our crop of last November. If our county vice-presidents could send in to the secretary reports of the conditions in their respective counties and he send them out to the members of the Society they could then know what the apple crop is and have a more accurate report than we now get. There is always a difference of 20 or 30 percent in one direction.

PRESIDENT PERRY: I remember four to five years ago when we had a large crop there was a short crop in the country generally, and yet the buyers somehow, got it inserted in almost all our papers that it was a very abundant crop all over the country. It was afterwards corrected in the "Free Press."

PROFESSOR HILLS: It was corrected in all the State papers.

PRESIDENT PERRY: The buyers managed in some way to get the papers to publish that false report.

PROFESSOR GULLEY: We are doing something of that sort in Connecticut. About the first of July the secretary sends out a little printed bill on which it states the amount of land in fruit, apples, peaches, plums, etc.,— and a list of the various buyers asking how many barrels or bushels you are likely to produce. The chief object is to get at the amount in the State, but a list goes right to the railroad men and they know where to send cars for the fruit, and upon that basis they arrange their cars so that they know many cars are going to be required for shipping purposes. It has worked out very well and the expense is not much.

PROFESSOR HILLS: Our last legislature changed the law touching the matter of agriculture by which the old Board of Agriculture was supplanted by a commissioner of agriculture who was instructed to collect statistics and publish crop bulletins. There is the place for the distribution of these statistics.

MR. HILL: I don't think it would cost much more than $10.00 and the collection of that information could be made

through our county vice-presidents. The county vice-presidents can find out what the legitimate expense would be for collecting data and for the expense of publishing. I think the money of this Society could be well spent. Take up potatoes or any crop grown by the Vermont farmer.

PROFESSOR HILLS: We have had considerable experience at the Experiment Station in collecting that data and I hardly think $10.00 would cover it, but I simply refer to this machinery for collecting in that way in Mr. Martin's office.

PRESIDENT PERRY: Would it not accomplish something if this Society would pass a vote to ask the Commissioner of Agriculture to procure these reports and send them out?

GOVERNOR PROUTY: As Professor Hills says, the law has changed in regard to the Board of Agriculture, and I believe very much improved. I think if the farmers would take this matter up and co-operate with the Commissioner of Agiculture and tell him what they wanted, and make suggestions to him, he would be very glad to co-operate with them. I believe we do not use the Commissioner of Agriculture enough. He is anxious to do all he can and if he can have the co-operation of the farmers of this State, I believe they will get what they want.

MR. KINNEY: Mr. Martin was down at our Fruit Exhibit and was very much interested in what he saw there. He told me personally that he was very anxious to do all he could in his line throughout the State, and I know he will do all he can for us if we will present the matter to him.

MR. WRIGHT: I move this Association request Mr. Martin to solicit full information, through the county vice-presidents, and make these reports at a seasonable time next autumn, and have them circulated throughout the State.

PROFESSOR HILLS: Mr. Martin has the use of our entire mailing list at the Experiment Station and the Press of the State.

Motion seconded and adopted.

MR. BRIGHAM: I would suggest that a copy of this discussion be sent to the Commissioner of Agriculture that he may be in a position to know the facts.

Suggestion adopted.

LIST OF AWARDS.

AWARDS ON PLATE EXHIBITS OF APPLES.

Kind	Prize Name	Amt.
Arctic	Second, W. C. Holcomb	$.50
Baldwin	First, G. H. Wright & Sons	1.00
	Second, A. T. Clark	.50
Bellflower	First, W. C. Holcomb	1.00
	Second, A. A. Halladay	.50
Bethel	First, E. J. Joslyn	1.00
	Second, L. Putnam	.50
Ben Davis	First, W. N. Phelps	1.00
	Second, W. C. Holcomb	.50
Blue Pearmain	First, A. A. Halladay	1.00
	Second, William Lawson	.50
Cooper Market	First, A. H. Hill	1.00
	Second, W. C. Holcomb	.50
Fallawater	First, W. C. Holcomb	1.00
Fameuse	First, A. H. Hill	1.00
	Second, W. C. Holcomb	.50
Golden Russet	First, J. Stevens	1.00
	Second, W. C. Holcomb	.50
Hubbardston	First, W. N. Phelps	1.00
	Second, A. A. Halladay	.50
Jonathan	First, A. T. Clark	1.00
King	First, G. H. Wright, & Sons	1.00
	Second, W. C. Holcomb	.50
Lady Sweet	First, G. H. Wright & Sons	1.00
Mann	First, A. T. Clark	1.00
	Second, D. T. Trombly	.50
McIntosh	First, W. C. Holcomb	1.00
	Second, A. H. Hill	.50
Mother	First, G. H. Wright & Sons	1.00
Newton	First, J. Stevens	1.00
	Second, G. H. Wright & Sons	.50
Northern Spy	First, G. H. Wright & Sons	1.00
	Second, D. T. Trombly	.50
Palmer Greening	First, D. T. Trombly	1.00
	Second, W. C. Holcomb	.50
Pound Sweet	First, A. H. Hill	1.00
	Second, D. T. Trombly	.50
Red Canada	First, A. H. Hill	1.00
	Second, W. C. Holcomb	.50

Kind	Prize Name	
R. I Greening	First, G. H. Wright & Sons	$ 1.00
	Second, W. C. Holcomb	.50
Rubicon	First, D. T. Trombly	1.00
	Second, W. C. Holcomb	.50
Scott's Winter	First, L. Putnam	1.00
	Second, E. J. Joslyn	.50
Spitzenburg	First, W. C. Holcomb	1.00
	Second, A. H. Hill	.50
Tolman Sweet	First, W. C. Holcomb	1.00
	Second, D. T. Trombly	.50
Wagener	First, A. H. Hill	1.00
	Second, G. H. Wright & Sons	.50
Wealthy	First, W. C. Holcomb	1.00
	Second, L. Putnam	.50
Wolf River	First, L. Putnam	1.00

BEST PLATE COLLECTION OF APPLES.

W. C. Holcomb	First	$ 5.00
A. H. Hill	Second	3.00
W. N. Phelps	Third	2.00

BEST EXHIBIT, BOX PACKAGES.

G. H. Wright	First	$ 5.00
T. L. Kinney	Second	3.00

BEST EXHIBIT, BARREL PACKAGES.

G. H. Wright	First	$ 5.00
Mrs. H. D. Allen	Second	3.00
T. L. Kinney	Third	2.00

BEST PLATE EXHIBIT OF PEARS.

Kind	Prize Name	Amt.
Anjou	First, W. N. Phelps	$ 1.00
	Second, A. T. Clark	.50
Lawrence	First, A. A. Halladay	1.00
Duchess	First, A. A. Halladay	1.00

FLORAL DISPLAY.

Cut Flowers	H. J. Ball	Second	$ 2.00
Potted Plants	H. J. Ball	Second	2.00

BEST COLLECTION NAMED VARIETIES OF POTATOES.

E. S. Brigham	First	$ 5.00
L. Putnam	Second	3.00
George Livingston	Third	2.00

MERITORIOUS AWARDS ON POTATOES.

E. S. Brigham	$ 2.00
L. Putnam	2.00

BEST DISPLAY OF VEGETABLES.

Cabbage	D. T. Trombly	$ 1.00
Carrot	D. T. Trombly	1.00
Onion	D. T. Trombly	1.00
Rutabega	D. T. Trombly	1.00

CANNED FRUITS.

Collection	Mrs. W. E. Robinson	$ 3.00
Apple Jelly	Mrs. W. E. Robinson	2.00

CONSTITUTION OF THE VERMONT STATE HORTICULTURAL SOCIETY.

ARTICLE I.

Name—This Society shall be known as the Vermont State Horticultural Society.

ARTICLE II.

Object of the Society—The object of this Society shall be for the purpose of improving the condition of pomology and other branches of horticulture, and disseminating correct information concerning the culture of such fruits, flowers, trees, and other productions in horticulture as are adapted to the soil and climate of Vermont.

ARTICLE III.

Membership—Any person may become a member by paying the secretary or treasurer an annual fee of fifty cents or a life member upon the payment of five dollars.

Honorary members for a time stated or for life may be elected at any annual meeting by a two-thirds vote of the members present.

ARTICLE IV.

Officers—The officers of the Society shall consist of president and one vice-president from each county of the State, a secretary and treasurer, an auditor, and an executive committee composed of the president, secretary and three additional members to be elected by the Society at each recurring annual meeting.

ARTICLE V.

Duties of the president and vice-presidents—It shall be the duty of the president to preside at and conduct all meetings of the Society, and deliver an annual address. In the absence of the president, this duty shall devolve upon the vice-presidents in their order. It shall be the duty of the vice-presidents to assume general supervision of the horticultural interests of their county, and shall make written report of the same to the Society at its annual winter meeting.

ARTICLE VI.

Duties of the secretary—The secretary shall record all the proceedings of the Society, collect and prepare all communications for the public press, and pay over all moneys received from members or otherwise to the treasurer on his receipt; receive and answer all communications addressed to the secretary, and, as an executive officer, aid the president in the dispatch of business relating to the meetings of the Society.

ARTICLE VII.

Duties of the treasurer—The treasurer shall collect and hold all funds of the Society and pay out the same only on the order of the president, countersigned by the secretary. He shall make up a report of all the receipts and disbursements of the Society and present the same at the annual winter meeting or at any other time when called upon to do so by the executive committee. He shall give bonds in such sum as the Society may direct, to be approved by the president and secretary, and the bond when so approved shall be filed with the State auditor.

ARTICLE VIII.

It shall be the duty of the auditor to examine the books of the treasurer and report same to the State treasurer.

ARTICLE IX.

Election of officers—The officers of the Society shall be elected annually by separate ballot and shall hold their offices until their successors are elected.

ARTICLE X.

Meetings of the Society—The Society shall hold their annual sessions at such time and place as seems best to the executive committee.

ARTICLE XI.

Amendments—By-laws and alterations of the constitution may be enacted by a vote of two-thirds of the members present at any regular annual meeting, one day's notice of the same being given.

LIST OF MEMBERS OF THE VERMONT STATE HORTICULTURAL SOCIETY.

LIFE MEMBERS.

Emery, C. S.	Newport
Dawley, F. R.	Montpelier
Hill, A. H.	Isle La Motte
Stuart, W.	Washington, D. C.
Vail, Theo. N.	Lyndonville
Vaughan, R. E.	Mount Hermon, Mass.

ANNUAL MEMBERS.

Aitkin, George	Woodstock
Alexander, J. J.	Williamstown
Allen, Mrs. H. D.	So. Hero
Allen, R. R.	So. Hero
Ames, H. L.	Island Pond
Baldwin, H. T.	Wells River
Bailey, George	Newport
Bailey, J. A.	Newport
Ball, H. J.	Newport
Ballard, S. S.	Montpelier
Barrows, E. B.	Brattleboro
Blakely, G. M.	St. Johnsbury
Blanchard, F.	Montpelier
Blanchard, A. C.	Montpelier
Blanchard, J. F.	Newport
Bogue, Nelson	Batavia, N. Y.
Bowman, H. A.	Montpelier
Brigham, E. S.	St. Albans
Bristol, R. H.	Vergennes
Bristol, E. S.	Vergennes
Broadfoot, A.	Montpelier
Brooks, H. K.	Swanton, R. F. D.
Brooks, John	Montpelier
Carleton, F. P.	Montpelier
Carleton, H.	Montpelier
Clark, A. T.	Addison
Crawford, H. H.	So. Hero
Corse, S. W.	Montpelier
Cummings, M. B.	Burlington

Currier, P. W.	Montpelier
Davis, L. L.	No. Pomfret
Deavitt, E. H.	Montpelier
DeThrestrup, H. V. F.	Burlington
Dodds, W. B.	No. Hero
Doule, F. H.	Somerville
Dunning, W. B.	Winooski
Dunsmore, G. H.	St. Albans Bay
Fair, W. D.	No. Calais
Fay, P. J.	Shelburne
Fleury, E.	Isle La Motte
Foote, F. E.	Middlebury
Foote, L. B.	Middlebury
Fullam, O. P.	Westminster
Gebicke, A.	Burlington
Gordon, Mrs. S. P.	Grand Isle
Gove, C. E.	Burlington
Green, Fred	Newport
Hadwen, W. E.	Bellows Falls
Hale, F. H.	Windsor
Halladay, A. A.	Bellows Falls
Halladay, G.	Bellows Falls
Hammond, Dwight	Newport
Hargreaves, Stanley	Burlington
Heaton, C. H.	Montpelier
Hemenway, R. L.	Middlebury
Hicks, D. C.	No. Clarendon
Hitchcock, S. E.	Newport
Holcomb, W. C.	Burlington
Horsford, F. H.	Charlotte
Howland, F. A.	Montpelier
Howe, C. D.	Essex Junction
Jacobs, H. B.	Vergennes
James, C. S.	Middlebury
Jones, L. R.	Burlington
Joslyn, E. J.	Newport
Knapp, C. E.	No. Bennington
Kinney, T. L.	So. Hero
Landon, T. B.	So. Hero
Lane, C. R.	Middlebury
Lawson, A.	Newport
Lawson, Wm.	Newport
Le Page, Mrs. Charles	Barre
Lewis, A. A.	Burlington
Libby, F. J.	Newport
Livingston, George	Newport
Macomber, G. H.	Grand Isle
Merrill, T. R.	Montpelier
Miller, J. A.	Dummerston

Morse, D. H. .... Randolph
O'Connor, P. H. .... No. Calais
Ormsbee, C. O. .... Montpelier
Otis, C. W. .... Middlebury
Parker, J. A. .... Waterbury
Peck, Cassius .... Burlington
Perry, G. W. .... Chester Depot
Phelps, W. N. .... So. Hero
Pollard, L. H. .... Montpelier
Powers, H. S. .... Ryegate
Prouty, G. H. .... Newport
Putnam, L. .... Cambridge
Richards, W. N. .... Vergennes
Richmond, C. W. .... Newport
Roberts, C. B. .... Montpelier
Robinson, W. E. .... Newport
Robinson, Mrs. W. E. .... Newport
Russell, C. L. .... Norwich
Senter, C. H. .... Montpelier
Sheldon, L. H. .... Fair Haven
Sibley, A. J. .... Montpelier
Small, F. M. .... Morrisville
Smith, C. F. .... Morrisville
Smith, Charles A. .... Montpelier
Smith, H. M. .... Montpelier
Smith, P. S. .... Montpelier
Smith, S. W. .... Addison
Stafford, Dana H. .... Brattleboro
Stevens, J. McLean .... Orwell
Talcott, L. H. .... Williston
Talcott, F. .... Williston
Terrill, G. H. .... Morrisville
Titus, E. V. .... Glen Cove, L. I.
Totman, H. M. .... Randolph
Tracy, J. E. .... Burlington
Trombly, D. T. .... Isle La Motte
Vaughan, A. M. .... Randolph
Wagoon, A. R. .... Newport
Waugh, F. A. .... Amherst, Mass
Wellington, J. W. .... Burlington
Wells, A. R. .... Newport, R. F. D. No. 1
Wilson, Fred .... Newport
Wiltfanck, F. .... So. Hero
Wheelock, H. R. .... Montpelier
Wheelock, M. W. .... Montpelier
Wright, E. L. .... Middlebury
Wright, G. H. .... Middlebury
Wright, H. J. .... Middlebury

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PROCEEDINGS

OF THE

SEVENTEENTH ANNUAL MEETING

OF THE

VERMONT MAPLE SUGAR MAKERS' ASSOCIATION

HELD AT

BURLINGTON, VT.

January 4th and 5th, 1910

MONTPELIER, VT.
CAPITAL CITY PRESS
1910

SEVENTEENTH ANNUAL MEETING

OF THE

VERMONT MAPLE SUGAR MAKERS' ASSOCIATION.

Tuesday Afternoon, 2:30 o'clock, The Armory.

After the meeting had been called to order, President Croft, of Enosburg Falls, presented his annual address as president of the Association.

PRESIDENT'S ADDRESS.

"*Members of the Vermont Maple Sugar Makers' Association:*

"We again meet in this our seventeenth annual convention of Sugar Makers of Vermont for general review of the past year with its results, and to catch some glimpse, if possible, of what the new year into which we are now entering may hold in store for us, as relates to those products of the farm in which this association is most keenly interested. That unknown quantity which we call the future is one which we cannot possibly know but little of. History is made only one moment at a time, still much, very much of what the record will be, depends upon preparation for coming events. Thus the towns, the state, and the national government, as well as the corporations, manufacturers, and all well-ordered business enterprises, early in the year, take account of stock and lay their plans, which in a large measure will be the governing powers that will record the history of the year.

"Thus it becomes important that the class of men in whom in a very large measure this history making of Vermont is vested, and upon whom depends in a still larger measure the material increase or decrease in the prosperity, wealth and happiness of these citizens, meet in convention and make plans for carrying on the business of 1910. That branch of agriculture which especially concerns this annual meeting of the Vermont Maple Sugar Makers' Association relates, as you well understand, to the maple products. The year 1909 and its results is now a matter of record. That the product of the maple groves upon the hillsides and mountains has been one of the most, if not the most, profitable of all farm crops, there is not much question.

"The yield of the maple orchards was fully up to the average of the past decade, and the price as remunerative as that of any former crop and a better average price than that of the past ten years, the entire crop having found a ready market at a price

ranging from 8 cents to 10 cents a pound. Never, perhaps, in the history of the maple sugar making has this revenue been more appreciated or proved of such intrinsic value to the agriculturist as the past year. With drought conditions prevailing, cutting short the income from farm and dairy products, the money value of the maple product was opportune indeed, coming at a season of year when the pressure for funds to meet the requirements and demands upon the average farmer for grain bills, farm seeds and taxes was most imperative. Fortunate, indeed, was the farmer who could turn into ready cash one, two, or more tons of maple sugar, realizing therefrom two, three or four hundred dollars.

"In my own community the effect upon business of this cash revenue derived from the sale of maple sugar was very perceptible, and the farmer who has been so foolish as to sell off his farm the maple groves, we believe realizes today more than ever "that he killed the goose that laid the golden egg," for more and more is the pure maple product coming into demand, and broader are becoming its markets, and more staple its value. In view of this fact I would urge the members of the Vermont Maple Sugar Makers' Association to improve in every possible way their methods of manufacture to the end that the cost of production may be lessened and the quality of the product improved. There is no question in my mind but what the State of Vermont, by careful preservation and cultivation of the maple, soon will become able to produce annually 20,000,000 pounds of maple sugar with a value of one and one-half to two million dollars; this revenue, being distributed very evenly over almost the entire State, enters at once into trade channels and promotes in no small degree business thrift and prosperity in the early months of the year.

"Buyers and consumers of the product are becoming more discriminating in regard to quality, and a good article even in a wholesale way commands a better price than the ordinary or inferior grade. Confectioners are requiring a better grade than formerly and mixers are coming to learn that the real maple flavor that appeals to the taste is obtained only in maple products of the finest grade. There is need of attention being given this matter of quality; too much poor, low grade sugar is being made. I know of a large sugar producer in my own town who had last spring about 1,000 pounds of stuff so poor in quality it would not grain into tub sugar, and he was obliged to sell at a loss of five or six cents a pound, half enough to have paid for a good rig which would handle his sap and convert it into sugar before it became practically valueless.

"Do away with the storage and increase your evaporating capacity. There is nothing gained by a slow process; boil your sap as fast as it runs, get it out of the way and be doing something else when it don't run. These are the questions which you are here to consider. Let your discussion be free and general; make this meeting to glow with life and live issues. Never before in the

history of the State were prospects brighter for the agriculturist of Vermont than today. Take a hand in making its history. There is only the present in which you can act; get on the stage and take your part.

"A generation hence it will matter not to you whether there will be maple groves upon the hillsides of the Green Mountain State, or trunk lines of permanent roads threading its beautiful valleys, for you and I will have travelled over that trunk line which leads but one way, and that to our permanent abode, but others may profit by what you accomplish. Do not be discouraged over a short period of drought conditions. The increase in price makes good the decrease in your products. Have confidence in the future; it is the golden hook by which we cling to the true, the good, and the beautiful. As we swing around the universe let no snarling dogs of jealously trail the caravan of progress, then will results supplant theories and things will be accomplished in this generation.

"There are a few suggestions which I wish to offer, then the time is yours. Tap all the maples available upon the farm, make the very best possible product you can, see that your syrup complies with the requirements of the National Pure Food and State Laws, making sure that every gallon contains 11 net pounds of high grade maple syrup. Do not make any poor quality maple sugar or syrup if possible to avoid it. The time is very soon coming when the difference in price between the good and inferior grades will be much more than now. A maple orchard is far more productive of revenue compared with cost of maintaining and cultivation than fruit orchards can be made in Vermont. Set out a few trees every year upon those barren, rocky hillsides. It will take but a few days of time each year to transplant a hundred small maples, and in 20 to 35 years the coming on of the next generation will rise up and call you blessed, and the picturesque beauty of the dear old Green Mountain State, the pride of the East, will grow in grandeur, and its verdant green of summers with its autumnal tints and golden glow will enlarge in beauty until no other land with it can compare, and the aerial tourist as he floats in the misty haze above the mountains and valleys will be led to exclaim, 'A Paradise not lost, but found.' "

ONE MAN'S EXPERIENCE IN MAKING MAPLE SYRUP AND SUGAR.

J. R. HAYES, STRAFFORD.

J. R. Hayes, of Strafford, spoke of his personal experience in making sugar and said that the deeper the sap in the evaporator the darker will be the product. He aims to boil with but half an inch of sap in his pan. He also said that the mixing of sap of different densities in the boiling pan is not desirable, and that he had an arrangement whereby sap is introduced at one end and flows in a continuous stream, similarly to a gravity system, around the pan or evaporator and out at the opposite end, which was vastly superior and a system to be preferred to boiling in single pans. The speaker laid special stress upon cleanliness being an absolute necessity and also that rapidity of boiling was an equally essential point and fully as important in arriving at a satisfactory result in reducing sap to syrup, meaning that the sooner sap is boiled after it leaves the tree and made into the finished product the better the result. He said that corrugations on the bottom of the evaporator may, by giving more surface to the fire, evaporate more rapidly, but this advantage is lost in the greater depth of sap necessary, and also in the increased difficulty of keeping the pan clean and free of a deposit of lime or niter, and that he considered the best evaporator to be one with the fewest corrugations and irregularities in its surface. Mr. Hayes considers the necessity of keeping the bottom of the pans free from soot, an important factor as soot retards boiling and requires additional fuel. In closing his remarks, the speaker called attention to the advantages and disadvantages of the use of covers on sap buckets and made the statement that the adherents of each system are about equal in number. He said it was admitted that in some instances, in case of storm, the covers saved a run of sap; on the other hand, their use involves extra labor and requires extra time, and, except in case of a storm, they are a nuisance, and he said it was a problem for each sugar maker to work out for himself.

DISCUSSION.

PRESIDENT CROFT: Crystallization in syrup is a matter that needs attention; it causes much trouble and expense. I saw some syrup a short time ago that had from half an inch to an inch and

a half crystallized hard rock candy in the bottom of the cans, which it would take hours of boiling to dissolve.

MEMBER: Was that put up cold or hot?

PRESIDENT CROFT: Cold.

MEMBER: Do you have crystallized syrup if you put it up hot?

PRESIDENT CROFT: Yes. Do you think the thickness of the syrup has something to do with it?

MEMBER: You take syrup that is light and you won't find any crystals in it; I think a too heavy syrup will nearly always crystallize.

MR. SPEAR: The crystallization of syrup is almost entirely unnecessary if a person uses a fair degree of care in putting up the product. We have handled from 2000 to 3000 gallons of syrup, perhaps more, and I don't believe in the whole of it we have found one pound of crystals. It seems to me that it is wholly unnecessary to put up syrup of that degree of thickness that will cause crystals to form. Customers don't like to get syrup so thin it will sour, neither do they enjoy buying syrup of that thickness that they will find crystals in the bottom of the can. If syrup is put in the cans weighing exactly 11 pounds to the gallon there will be no crystallization. If the product is put into cans weighing 11 1-4 pounds you will get more or less crystallization, and that, in our experience, is the only reason why you will get crystals,—the fact of boiling the syrup too thick before canning.

MEMBER: Don't you think you are more apt to get crystallization in the better grade of syrup, the earlier runs, than later?

MR. SPEAR: No. It certainly will grain quicker, but one must use discretion, and if you test your syrup and get the correct weight before putting the syrup in the cans you will not have any formation of crystals in the bottom of the cans.

MR. BROWN: I have seen the finest maple flavored syrup made from these crystals, by simply adding a little water and allowing them to dissolve.

MR. SPEAR: Even so, we don't want to have crystallization take place in our product. We have been shipping a customer a supply of syrup for several years, and all had gone nicely until, a couple of years ago, after shipping the usual amount of goods to him, he wrote me that he had always had confidence in our goods and had supposed we were putting up pure goods, but that the shipment last sent contained a quantity of rock candy in the bottom of the cans and so he did not want any more of our goods. I have never been able to convince him of his mistake and have not shipped him any more goods since. That is an example of what crystals in the bottom of cans will, in some cases, do for our maple business.

Tuesday Evening, January 4, 1910.

THE PAST, PRESENT AND FUTURE OF THE MAPLE SUGAR INDUSTRY.

M. C. THOMAS, OF THE OHIO INSTITUTE BOARD, MINGO, OHIO.

Mr. Chairman, Members of the Vermont Sugar Makers' Association:

You have a national reputation for several products: your Morgan horses; your maple products; your beautiful scenery, and last,—but not least,—your great men. It may be that I have taken in too much territory, as the saying is, in my subject, but when your Secretary wrote and asked me if I would come and address this meeting I told him I would. He asked me to name my subject; I was very busy in other work and this subject came to my mind,—the past, present and future of the maple sugar industry.

I may be in the discussion of this subject like a colored brother who said, in the discussion of his text, that he wished to divide his sermon into two parts. He said the first part had reference to the text; and the second part had no reference to his text, and he would proceed to discuss the latter part first,—so if I do not keep my subject always in sight you will know the reason why.

I have always had a desire in my heart to meet and come in personal contact with the Sugar Makers of the State that produces annually the most maple syrup and sugar of any State in the Union—Vermont. Not for the reason that I might bring to you any new methods, for ours is a very intricate enterprise, the success of which depends upon a great many conditions and circumstances, but it is an old saying that: "In a multitude of counsel there is great wisdom," and I am confident that after having attended these meetings I can go back to my farm in Ohio, better qualified, better fitted, with a clearer conception and understanding of the problems that are confronting the Sugar Makers in Ohio and elsewhere.

If we allow our minds to go back a few centuries we will see this land of ours covered with a dense and beautiful forest growth of maple trees. We see the Indians roaming over it at will, killing the deer and other wild game; and in the early spring when Nature is putting forth, prior to 1675, we hear of the Indians breaking the root of the maple tree, and placing under it a receptacle in which he catches the sap as it runs from the broken root, and

perchance he will cook his venison in that sap, and if he boils it long enough, he is surprised to find that he has taffy or sugar. This is the first history we have of the manufacture of maple sugar. The early New England settlers learned the art of maple sugar making from the Indians. Now, it is true the methods of these early settlers were very crude, but many were the happy days that were spent in the early sugar camps, and if we go out into the woods we can yet see traces of the methods and practices they followed.

In my own county, hundreds and hundreds of maple trees were destroyed by the early settlers that they might have the ground upon which to grow grain to keep the wolf from the door; and today, if that same land was occupied with that growth of maples, such land would be worth a great deal more than at the present time.

In these early days in tapping the trees, they used an axe and cut a notch into the trees; they then cut a circular hole at the lower corner of the notch and inserted a spile; ordinarily that was simply a piece of wood with a groove cut out of the center. Many of the receptacles were made of walnut trees cut down and into blocks 30 inches long, those cut in two and troughs made of them, and today we can go out into our woods and see traces of those crude vessels.

We have progressed step by step; a little later on we see they tapped the tree by using a large bit, sometimes an inch in diameter, and inserted a spile made of sumac or alder. If the days happened to be a little warm after tapping, these were apt to sour and the product would be damaged; if there happened to be a few dry days, there being so much space for the air to enter, the hole would soon dry over and the work would have to be done again.

In the way of vessels we have also made progress. After the old wooden troughs, crocks were used, then the wooden buckets, and later the galvanized iron or tin. In these early days the methods of evaporation were very crude also. In the beginning it was a pole placed between two forked sticks, a large kettle hung upon it with a fire underneath, and the boiling accomplished in that manner, and very often the result was a mass that more resembled tar than maple syrup. The next step was to build a furnace out of flat stones and we can still see traces of those furnaces in our maple groves. The furnace would be strong and large with a small chimney, four or five feet high, and four or five or six kettles placed on it. No grates were placed in these furnaces, but in the front an iron bar was put to keep one end of the wood off the ground. The next step we see furnaces constructed of brick and iron grates put in them, larger chimneys constructed, and with space for from eight to ten kettles. Still later come the boiling pans used in connection with the iron kettles, and these were used by constructing a double furnace,—the kettles occupying one furnace and the pan the other. These pans varied in

width from thirty inches to three feet. The bottom of the pan was a little higher than the row of kettles, and leading into each kettle was a faucet. The water would go into the boiling pan and into each kettle, and in my State many sugar makers are still clinging to that method of boiling sap. With these double furnaces the syruping off is done in the kettles, but the up-to-date man has a different rig.

Now I have briefly outlined some of the methods used in the past, but I believe that the one thing that concerns us most is the present and also the future outlook. If we are going to succeed in making maple syrup or sugar we must always have this in mind: That we are not manufacturing a necessity, we can get along without maple sugar and syrup, we are manufacturing a luxury; and whenever we get away from that idea and manufacture a product that is not up to standard in quality and color we have a product that is not going to tempt the palate of the men who have the price to pay for the best article, and we will not reap the greatest reward from our maple orchards.

The first thing I wish to mention is the shed. I don't know what your conditions up here are, but I will give you our methods and if I strike any point that interests you I hope you will ask questions, for in the discussion of a subject we get our greatest good. We always want our shed constructed on the side of a hill so that we may drive up on the side and get the water into the evaporator without constructing a bridge to drive upon. In the case of my own shed, we drive way up above on the hill and have the water spouted, as we can do that much cheaper than to build a bridge. I want the shed where I have my boiling outfit to be perfectly tight, so the air and wind cannot come in, then I want a shingled roof,—some use a metal roof, but I do not like that, there will be a constant dripping off and into the sap.

Then I want a ventilator as long as the evaporator so that I can let the wings of the ventilator out, and the steam can escape from the shed. It is very undesirable to work in a shed where the steam settles all around. I want a partition between the boiling room and where I keep the wood so I can keep the steam out of the wood and also that the dirt can not get into the sap during the operation of putting wood on the fire.

Next comes the boiling outfit and I might say that I have tried quite a good many kinds and I have not yet found just what suits me. We have tried all kinds of evaporators and kettles, and some of my neighbors have steam boiling outfits. That is a splendid way of evaporating the sap, using a boiler and allowing steam pipes to pass through wooden boxes which will evaporate the sap very rapidly, but it is not the right kind of an outfit for a man to use unless he has a large bush for it is quite expensive to construct. One point I wish to impress upon you is this, I find that nine out of ten men buy a machine too small for their needs. I made that mistake when I first purchased. The agent

told me what the machine would do and I took him at his word, but I found right off after I got started that the machine was not large enough. In the ordinary evaporator I like about ten square feet of boiling surface for every one hundred vessels. I find it much better to have a boiling outfit so large that you do not have to be bothered about much storage room. I would not give much for a large storage tank.

As has been said this afternoon, if we are to make the finest quality of maple syrup and sugar we want to get the sap into syrup or sugar as soon as possible after it runs from the tree. I have always contended that if we could get the sap from the tree, exclude the air and evaporate it almost instantaneously, that we would have syrup almost as clear as water,—practically no color,— and we would also have that mild, delicate maple flavor. I have known men who said they did not like light colored syrup, saying it did not have the maple flavor, and I have heard them say that they preferred maple syrup or sugar made in an iron kettle because then they got the real maple flavor. I maintain we get the best results by quick evaporation and as soon as possible after sap runs from the tree. I have my evaporator put upon a brick arch,—in that manner I find I can get more out of an evaporator than by using cast arches. I desire my arch constructed with a little slant from the front to the rear. In an arch 16 feet long say one inch. If you have it built level and are firing at full speed you may have trouble in getting the syrup to work back fast enough. I used to think that one needed to fill the furnace up at the rear end under the pans and only leave a space of four or five inches in firing. That is a mistake. I like to have it so that the fire rolls over and over and in that manner you get a better result, and then, too, I wish my chimney built as high as the furnace is long, by that method you get ample draft.

Now as to operating the evaporator, I think the shallower I can keep the water in the machine the faster it will evaporate and the better the quality of the goods. If you start the evaporator and have the water deep in it when it goes to boiling, steam bubbles are formed in the bottom and a great many bubbles will burst before they reach the surface and in that way you do your work of evaporation twice. If you have your water shallow every time a steam bubble is formed it will come straight to the surface and burst and the evaporation goes on more rapidly.

We finish our syrup in the evaporator using a saccharometer to test every gallon and we know that it weighs exactly eleven pounds. I do not want any variation and I am confident if we test by the saccharometer and have the syrup of the right weight we will have no trouble caused by crystallization in the can. I attribute my success to having the syrup of the right weight before taking it from the machine.

Now to get rid of the niter or lime we always filter the syrup

and use felt strainers, and by doing that we can have it clear and sparkling. The canning is done when the syrup is hot and we fill the cans full. I believe people make a mistake in not filling the cans full, thereby leaving an air space. There isn't any one thing that will kill our trade any quicker than putting up syrup not up to the standard in weight, or on the other hand to have it weigh too heavy which will cause crystallization. We cannot hold the trade unless we put out a first class article and keep our customers satisfied.

Last year we had one of the greatest sugar seasons in Ohio that we had ever had, beginning the latter part of January and continuing until the 25th of March.

We use all kinds of spiles, but I prefer a spile that we can use by tapping with a three-eighths inch bit, I don't like to bore a large hole. That is the method we use in tapping the first time; then after they have been in two or three weeks, and if we have some mild weather, these spiles are apt to dry up, and if it again freezes up we don't get much sap. We don't ream out that hole but simply bore a new one. This time we make a one-quarter inch hole and do not insert a metal spile, but a little cane reed spile,—and that little spile will run as much water as one of the metal spiles. There is not so much space for the air to penetrate and they don't dry out as quickly. You see we do a great deal of tapping. Sometimes after putting in these two spiles and getting a good run, then we have a few warm days not freezing very much and these spiles will dry up, then we will have some weather like the discussion this afternoon—a warm spell—we don't want to quit making so we go around and remove the spiles, take them to the sugar house and thoroughly cook and scald them and thoroughly scald the vessels, then when it freezes up again we go and bore a new hole with a three-eighths inch bit. This last year, during the long season, we bored that third hole, then by having all of our vessels clean we made just as good a syrup as during the first of the season, but this does not hold true if the warm season lasts long enough to start the buds.

We use metal buckets, although some in Ohio use the wooden buckets still. Of course, we don't like to discard all of our old outfit, but if I were buying new I would have the galvanized buckets with covers, although I know that some years we feel that the covers do not pay,—other years they do. For instance, last year the covers would not have been of very much value to us for the rains did not come while we were getting our good runs, but I sometimes think that it is a good thing not to have the covers and let the rain water get in the vessels as that is a good time to clean them, and in the long run I think it is as well to get along without the covers.

The question of lime in the evaporator used to bother me, but I found that the wisest and best way to get rid of it was to use muriatic acid mixed with seven parts of rain water. I can clean

any pan with that preparation in a very short time. Buttermilk will loosen the lime in a short time, but not as quickly as the action of muriatic acid. Also in drawing off the syrup I stir it often while it is going into the strainer so that the filter may catch more of this lime and not leave so much to adhere to the pans.

I have briefly outlined some of our work and methods. The next thing comes the marketing of the product. That is the important part of the operation. We can make an article that is all right, but we may lose a great deal of money by not properly marketing it. I was talking with our freight agent the other day and he said that twenty years ago nine-tenths of the maple sugar and syrup in my locality was shipped to wholesale dealers in Cincinnati; the molasses put into barrels and the sugar made into cakes; and that now there isn't a tenth of the output of our locality shipped to commission men. Every sugar maker in my locality is his own commission merchant, he has his own customers.

I remember a few years ago one of my neighbors had a camp of about 1,800 vessels; the market was poor that year. He said to a dealer that he was going to Dayton to work up his own trade. The dealer laughed at him and said his trip would amount to nothing. The sugar maker went to Dayton and spent two days and while there disposed of 600 gallons of syrup. Now that sugar maker cannot supply the demand for his goods in Dayton. A gentleman told me here today that last year he shipped some sugar to his son in Dayton, Ohio, and received fifty cents a pound for it. We can all of the syrup produced in quarts, one-half gallons and gallons, and place six gallon cans, twelve and one-half gallon cans or twenty-four quarts in a shipping case. I ship directly to my customers, who are scattered—some in New York State, Colorado, California and down into Old Mexico. There is no reason under the sun why you sugar makers cannot sell every pound of sugar and every gallon of syrup you wish to dispose of direct to the consumer. Here in the East you have better markets, as you are only a few hours from New York and Boston, and there are individuals in both of these cities to buy hundreds of dollars worth of sugar products, and if you make the right article and get it to them in proper shape you can command the highest prices. We are nearer the Chicago market, and you know what is said regarding Chicago, "There are larger camps than can be found on any farm."

I think we have a first class law in our State and I wish to call your attention to one or two clauses in it. In the past we have had men who had a slick way of putting a label upon their can that would cause the prospective buyer to believe the can held maple syrup, while at the same time it would contain possibly a very small amount of pure maple. Now our law will not permit a dealer, manufacturer, or any person having syrup to sell, to place upon the package containing that product a label bearing the word "Maple" unless it is *all* maple.

SECTION 5 AND SECTION 6, OHIO PUBLIC STATUTES.

SECTION 5. Any person who shall offer for sale, have in his possession with intent to sell, or sell or deliver any adulteration of maple syrup, or maple sugar in any box, can, bottle or other package having the word "Maple,"or any compounding of this word, as the name or part of the name of the syrup or sugar or any device or illustration suggestive of maple syrup or sugar or the manufacture thereof, shall, upon conviction, be punished as provided in Section 6 of this act.

SECTION 6. Any person who violates any of the provisions of this act shall be guilty of a misdemeanor and upon conviction shall be fined not less than fifty nor more than two hundred dollars and shall pay the costs of prosecution.

Last year a man up near Cleveland put out a brand of goods he called, "Maple Blend Syrup." A great many buyers thought because the word "Maple" was on the label they were getting maple syrup. It was found upon examination and analysis that he was using cheap sugars for the sweet and boiling a piece of maple wood in water to give it the maple flavor. This law has stopped that sort of thing. We put our labels on all our goods guaranteeing them to be pure, and if any are found not as represented they are to be returned and the money will be refunded to the purchaser. In this way we are building up a trade that is increasing rapidly.

In giving amount of work done we reckon by the number of vessels we put out instead of counting the trees as you do. Last year I had a neighbor who put out 1,550 vessels; he sold from that camp just $1,000 worth of sugar. Another neighbor, who put out 940 vessels, sold $530 worth of syrup. Still another neighbor had out 625 vessels and sold his output for $313.

I believe, Friends, that the man who has a sugar bush upon his farm, of healthy, thrifty trees, and is willing to equip it with the proper kind of machinery to make the very best article that he can possibly produce, and will sell his output directly to the consumer, guaranteeing that product to be all right—that that man has a gold mine on his farm.

The maple industry is on the decline. Ohio as a State has not produced as much maple produce as it did ten years ago and I expect the same is true of Vermont. The product is a luxury and taking these things all into consideration, and realizing that our population is increasing in this great country at the rate of 1,000 a day, and that we have many men who are willing to pay a good round price for an article that is first class, it is "up to us" to produce the quality of goods the public want.

DISCUSSION.

MR. HAYES OF STRAFFORD: I would like to inquire if muriatic acid, that the speaker uses to remove malate of lime,—what action that has upon the pan itself?

ANSWER: If you leave it in the pan it will eat the pan as well as the lime. The solution should be removed as soon as the lime loosens. We clean all of our machinery with this acid twice during the season, and if the machinery is so cleaned you will get better results throughout the season.

MR. HAYES OF STRAFFORD: What is the cost of the acid?

ANSWER: I can buy it for fifteen cents a quart, and half a pint will clean an ordinary sized pan.

MR. MCMAHON: What price per gallon are you getting for syrup?

ANSWER: My prices run from $1.25 to $1.75 a gallon can, F. O. B. my station. A few years ago $.80 a gallon was a good price with us and I have seen it as low as $.45.

MEMBER: Whereabouts do you make the last two holes (in tapping) in relation to the first one?

ANSWER: We aim to put them at one side, say three inches and possibly a little bit higher,—just so the water will go into the bucket; and for the third hole, go to a different part of the tree. The first part of the season we tap on the south, east or west, for on warm days it will run early, and in the latter part of the season we go to the north side of the tree and keep the vessels in the shade.

MR. YORK OF LINCOLN: Does it not injure the trees to tap three holes in a season?

ANSWER: I hardly think it does when you tap with small bits. I would not want to use large bits and tap three times, and, of course, it is not often that you make the three holes.

MEMBER: What is your average run per tree?

ANSWER: It varies a great deal. I know one year I made about 60 gallons from 800 vessels and last year it ran up to about 350 gallons.

MR. YORK OF LINCOLN: What kind of an evaporator do you use?

ANSWER: At the present time I am using a..........., simply a flat bottom and the pans are made in sections.

PRESIDENT CROFT: What portion of your State produces maple to the larger extent?

ANSWER: The northeast part of the State.

MEMBER: Would a pound and a half of sugar to a tree be a fair average?

ANSWER: I think so. We make very little sugar but when we do make sugar it is made into one-half pound, one pound, and two pound cakes, and these are packed in boxes according to the customers' desires.

COLONEL FOSTER: Where does your syrup go?

ANSWER: Largely to the West. Personally, I have a large trade in Colorado. The cities of Dayton and Cincinnati have a large number of wealthy people and we ship six and twelve and eighteen gallons to individuals.

COLONEL FOSTER: Is there more profit in syrup than sugar?

ANSWER: Yes, at the price we sell.

COLONEL FOSTER: Do you tap your maple shade trees?

ANSWER: No sir, we do not.

MR. ADAMS: Do you think a tree that has been set out or transplanted will run as much sap as one that stands in its original location?

ANSWER: I could not say about that, but I believe it will. I don't see why it wouldn't.

MR. SPEAR: Do you market all of your products in the spring?

ANSWER: No sir, many of them are put into cold storage and held there over summer and marketed in the fall. That is especially true when we have a very large run. Otherwise we market our goods in the spring.

WHAT THE MAPLE SUGAR MAKERS' MARKET HAS BEEN DOING IN THE LAST YEAR.

V. I. SPEAR, RANDOLPH.

Mr. President, Members of the Association, Ladies and Gentlemen:

I am always very much pleased to have our brothers from Ohio come to Vermont to confer with us in the matter of maple sugar making, and of all those that we have had before, I would say that I have enjoyed none more than I have the speaker we have had with us this evening. There is a good lesson for all Vermonters to learn from Ohio in the matter of manipulating the maple crop. While perhaps we are older and do a little more business, Ohio has learned one lesson ahead of us and has been profiting by it while we have been sleeping, and it is this: They have learned the lesson of selling their crop in the form of syrup while we have been putting up tub sugar to sell to manufacturers for the purpose of seasoning cane sugar, and they have been getting the profits of this business while we have been doing the work and letting the fellows who sell the blended syrup have what little profit there is connected with the maple sugar industry.

I have had considerable to say in years past before this Association in regard to this same point of making our product to sell in the form of syrup instead of putting so much of it into sugar. With us it is simply a matter of having a customer in the habit of getting our sugar and so we keep on putting it up in wooden tubs, and perhaps melting it later if some one desires syrup, rather than putting it into marketable syrup form and finding a customer for it at the time of manufacturing it. There is, and there will be for a good many years, a market for tub sugar that we make and I think we ought to make considerable of it, but we ought to make it out of the "goods" that aren't quite good enough to sell for syrup. The first part of the season, when we are making our finest goods, we should put it into syrup rather than into sugar to sell to confectioners and others who buy it wholly for flavoring purposes.

I notice the subject I am supposed to speak upon is something about the operation of the maple sugar makers' market during the past year. If I was to answer the question that is asked as to what we have been doing this last year it would be very brief. I could simply say that we have been putting up and shipping our maple syrup and sugar pretty much every day since we were here last winter, and that brings me to one point in connection with the subject we have just listened to,—the advice given to farmers to market their own product, to find consumers and sell direct to them. Every one cannot do this. In the case of some farmers it is impossible for them to find these special markets for their

product and our advice to the farmer is this: If he has a market keep it. If he hasn't any, then we will help him the best we can. There is a class of trade that has the habit of using maple goods now that didn't two or three years ago. Under our Pure Food Law a good many of our large grocery firms got to using pure maple goods. It is necessary in supplying this trade at the present time for some organization like our own to have charge of supplies. There are very few producers that could supply through the year the demands of some of the largest of our city grocery houses, and with the present method of packing goods it would be very inconvenient for a farmer to undertake to carry out one of these contracts.

These houses used to come into Vermont in April and buy their year's supply, stock up with three or four thousand gallons and care for it as best they could. Usually much of their purchase spoiled before they got around to use it. They learned something from their experience, and now those same houses ask for frequent shipments and small ones. We have customers who take shipments once in about two weeks. We never know what their demand will be. It may be for 25 or 50 dozen pint or quart bottles or for two quart or gallon cans, or it may be half a ton of brick sugar or two ounces cakes. Whenever they call for it, or in whatever form, they expect we have it on hand and that we are able to take care of their shipment at once. You see with that class of trade the individual farmer would be entirely unable to fill the orders.

The conditions here in Vermont during the past year have been altogether different than in Ohio. In Ohio they had a long season and manufactured very good products last year; in Vermont we had a short season and made the poorest goods we ever did, and the two things taken together,—the poor goods in Vermont and the large amount and the quality of the product in Ohio,—didn't have a very good effect on prices here and prices have run a little lower during the past year than usual. The cause of the poor quality of our product was very well discussed this afternoon, and I think we have pretty nearly the right idea of it. It was due to unfavorable weather and something that the sugar maker was not to blame for. I don't know of anything we can do under such conditions except to make the best of them and to hope that similar conditions will not occur again.

The condition of the maple sugar trade at the present time looks to me to be encouraging. The markets seem to me pretty well cleared out. There is no heavy stock carried now as I am informed and I think if we have a good cold winter and people eat as much maple goods as they ought to between now and the first of April, we will come upon the spring market in good condition. This leads me to make another suggestion in regard to the matter of weather.

It is a little bit peculiar, but while the weather has an effect

on the production of sap it seems also to have an effect upon the consumption of the product. Take our city markets and let them have two or three weeks of warm, sultry weather during the winter, and immediately the call for maple goods goes down. Let the weather remain snappy and cold and we have a good market throughout the winter. The consumption will increase. There seems to be something about maple sugar that makes it a food for cold weather, and one that warm weather doesn't crave. Last winter was rather a warm season through the East and the general testimony of the dealers was that they never sold so small an amount of maple sugar and syrup as during that season, and they all attributed it to the warm weather, so that while we are shivering here in Burlington, and the thermometer is way down, we can think that perhaps it is doing us some good somewhere.

The prices for next year, I believe, are going to be very good, although it is too early yet to make any estimate. It is better on the whole to have a scale of prices that will take the product off our hands and use it up, rather than to have it left to carry over. I think the market can reasonably be expected to a little more than maintain its present condition.

DISCUSSION.

MEMBER: It appears to me that Vermont sugar makers must educate their customers to call for maple syrup instead of sugar if we are to sell our product as syrup. Our friend from Ohio says that the prices of maple syrup run from $1.25 to $1.75. When we get $1.25 for our best quality syrup we think we are getting a big price. My sugar orchards will produce from three to six or seven thousand pounds of sugar, according to the year. I have usually put up eight or ten dozen gallons of maple syrup and make the rest into sugar. Will some one tell me why the consumers of maple goods in Ohio naturally desire maple syrup, and the consumers of maple goods in Vermont, desire sugar? If there is more profit in syrup than in sugar, why we want to make the syrup and not the sugar.

MR. THOMAS OF OHIO: We have used no magic in our business, and I guess it must be that we simply started supplying our customers with syrup, for we never have been a sugar producing State. I would like to hear what Brother Spear has to say.

MR. SPEAR: A few years ago I was out of the State, in Maine, one season and in looking through their dairy work I found that nearly all of the dairymen in Maine were shipping their cream to Boston, while Vermonters were shipping their butter

to Boston, and the Maine farmers were getting a good deal better profit out of the cream than we got out of the butter, and the question came into my mind as to why it was so. I asked some questions and the people in Maine accounted for it by the fact that they had been more enterprising than we in getting the market established, and I expect that is true in this matter of a maple syrup and sugar market. In Ohio the consumers are not looking for sugar and in Vermont they do not expect to get a great deal of syrup so they enquire for sugar. There is a field wide enough for us all in the matter of supplying syrup if we only have a good quality and go after the trade. For several years it has been quite difficult to secure syrup enough to supply the trade. I presume a good deal of the tub sugar that has been made—and some has been melted up to make syrup before it has gone out of the State—has been melted to supply this lack that the sugar makers have so far neglected to take care of.

There was one point that I had intended to refer to, that has been coming to us for the past two or three years more than ever before,—and it is a good thing for farmers to get their eyes on and be thinking about—the present demand for maple syrup is coming to be for a package smaller than the gallon can to a very great extent. The past year the move in that direction has been very marked and we have large demands for pint and quart bottles, in fact, more than three-fourths of our syrup has been shipped in that way. This is an intelligent act on the part of the purchaser, I think, for I realize that an ordinary family of two or three persons who buy a gallon of syrup and open it are liable to have some of it spoil before it is used; whereas if they buy a smaller package they can use it before it comes to harm.

MR. THOMAS OF OHIO: I can substantiate what my Brother Spear has said regarding the melting of sugar. We have two or three large dealers who buy sugar by the car load here in Vermont and Canada, and melt it, making it into syrup to supply the demand. I believe if you manufacture a first class article (in syrup) and let the people know what you have and that you want their trade, you will have a greater demand than you can supply, for such goods. It is a fact there wasn't a third enough maple syrup made in Ohio to supply our own home demand this last year, so you see there is a field in our State for Vermont to ship her goods to.

MR WALLBRIDGE OF CABOT: If you get $1.20 for a gallon of syrup, what ought you to get for a pint in a can?

PRESIDENT CROFT: The small cans should sell to net about $2.00 a gallon.

FORESTRY.

AUSTIN F. HAWES, STATE FORESTER, BURLINGTON, VERMONT.

The last speaker of the evening was Austin F. Hawes, State Forester, who gave an address on forestry, illustrated with lantern slides of photographs taken in this and foreign countries. He prefaced his illustrated talk by saying that although he was not a sugar producer and could give his hearers no information as to the manufacture of sugar, still he felt that the care of the sugar orchard was so closely related to the care of the forests in general, and that, as most of the sugar growers were also owners of other forest lands, he deemed it a fit occasion to discuss the subject of forestry in its broader aspects.

"The forests," said he, "perhaps are the most important of all for they pertain to the foundation of all that has been talked about, for without the forests, without the maple tree, we would have no occasion to be discussing the topics we have had under consideration today."

January 5, 1910. Wednesday 9.30 a. m.

PARLORS VAN NESS HOUSE.

BUSINESS MEETING.

Report of Secretary and Treasurer read by Secretary Chapin. Upon motion the same was accepted and adopted.

TREASURER'S REPORT.

Homer W. Vail, Treasurer, in account with the Vermont Maple Sugar Makers' Association.

DR.

Expense of M. H. Miller at Norfolk	$61.16	
Salary and expense of Secretary	56.25	
Expense of Mr. Seavy, speaker	13.00	
Expense of A. J. Croft	11.00	
Van Ness House, for board	23.50	
F. L. Davis, Expense of Ass'n meeting	67.75	
Miss Smith, reporter of meeting	27.63	
Vermont greater exhibit, for space	45.00	
D. W. Edson, for printing	10.79	
C. E. Parker, printing reports	70.67	
Vt. Sugar Makers' Market, membership fees	30.00	
Premiums paid	215.74	
		$632.49

CR.

Balance on hand January 1, 1909	$16.92	
State appropriation	500.00	
Received from the Secretary	93.27	
Cash on hand	13.51	
Deficit	8.79	
		$632.49

V. I. SPEAR: In regard to the Tercentenary exhibit, I have one thing to suggest to the officers and the members of this Association relating to the exhibit made here in Armory Hall last summer. At our last meeting it was voted to make this exhibit during the celebration. It was carried out but the undertaking didn't pan out as it was expected it might. There was practically no attendance at this exhibit, for what reason I do not know, and it was financially disastrous to every one that was connected with it. We put up an exhibit and placed a lady in charge for demonstration purposes but after a few weeks had passed we saw the attendance and sales were not going to justify keeping any one there, so we discharged the attendant and left our exhibit in charge of Mr. Sheldon. The result of the exhibit was just this, that we didn't get quite enough from the sales to pay the demonstrator, so whatever expense we were at in the matter, we are just so much out. The expense of the attendant was $9 a week—no one could do it for less—but there were not enough people visiting the exhibit to pay even that expense. So in connection with that affair the market stands out practically about $60 or $70 for expenses, and goods that were sent here.

MR. HOLDEN: I move this matter that Mr. Spear has brought to our attention be referred to the executive committee for a just settlement. Motion carried.

In a brief speech President Croft expressed his thanks and appreciation to the members for their loyalty to him during his presidency, and congratulated them upon the record and progress the association had made during the past 17 years. He said that the association had been and is highly beneficial to the maple sugar industry in the State, and that that fact was commented upon by people throughout this and other States as well as by Canadians, and that following the example of Vermont, Canada had formed an association along the same lines and was accomplishing like results and was getting pure food laws passed and building up the maple industry rapidly. He said that the association had done much to broaden the market and establish good prices for maple products until now maple sugar is a staple article, and that he doubted if in the future there was much chance for fluctuation in prices, and that he believed the conditions were due largely to the dealers and the people in the country being able to control the product, and not allowing a surplus to go upon the market and cause a glut. In closing, Mr. Croft added: "I feel, while you might be disposed to confer the honor upon me of making me your your president another year, that I would have to decline if you should do so, and I would like at this time to tender you my resignation and ask you to nominate my successor."

MR. VAIL: I am sure we are all fully appreciative of the services our President has rendered this association and regret that he seems determined upon resigning, but his decision I understand is final and that we must nominate another man as president for

the ensuing year. I have been looking the field over and while Mr. Soule is not present to either accept or decline the office, I would like to, at this time, nominate Mr. George H. Soule, of Fairfield, as president of this association.

The nomination was seconded by Mr. Northrop and other members, and upon vote Mr. Soule was declared unanimously elected as president of the association for the ensuing year.

The remaining officers of the association were elected as follows:

First Vice-President, W. W. Holden, Northfield.

Second Vice-President, W. E. York, West Lincoln.

Secretary, H. B. Chapin, Middlesex.

Treasurer, Homer W. Vail, Randolph.

Auditor, M. H. Miller, Randolph.

MR. VAIL: It has been the custom of this association to appoint a committee of one to confer with the committee appointed by the dairymen for the purpose of drawing resolutions. I would suggest that the Chairman at this time appoint such a committee.

PRESIDENT SOULE: I will appoint Mr. Vail as that committee.

MR. HOLDEN: I think the rule of this year that only one entry could be made by an individual is wrong. If there had been first, second and third premiums offered, and a man be allowed to enter syrup and sugar both, I think it would be better.

SECRETARY CHAPIN: I am confident that our method should be adjusted differently, and move that it be left with the President and Vice-President, also the Secretary to arrange the matter.

Upon motion of Mr. Northrop that the convention be adjourned, duly seconded by Mr. York, the association did adjourn its seventeenth annual meeting.

PREMIUMS.

ARTISTIC DISPLAY.

First, N. E. Colvin,	Danby,	\$25.00
Second, O. H. Jackson,	Westford,	15.00

LARGEST AND BEST DISPLAY BY PRODUCER.

First, E. P. Walbridge,	Cabot,	\$25.00
Second, C. H. Colvin,	Danby	15.00

SUGAR.

		Score
L. C. Hayes,	Strafford,	99
W. W. Holden,	Northfield,	91
T. G. Bronson,	East Hardwick	96
W. H. Patterson,	Fairfield	96
M. Prindle,	St. Albans,	99
C. L. McMahon,	Stowe,	92

SYRUP.

		Score
D. A. Kneeland,	Waitsfield,	98
A. E. Wilder,	Middlesex,	96
L. O. Wilder,	Middlesex,	93
F. M. Bigelow,	Essex,	91
George H. Soule,	Fairfield,	97
P. B. B. Northrup,	Sheldon	83
Daniel Mackin,	Sheldon	98
C. E. Martin,	Rochester,	97
John C. Holden,	North Clarendon	99

OFFICERS OF THE VERMONT MAPLE SUGAR MAKERS' ASSOCIATION.

PRESIDENT, G. H. SOULE, FAIRFIELD.
SECRETARY, H. B. CHAPIN, MIDDLESEX.
FIRST VICE-PRESIDENT, W. W. HOLDEN, NORTHFIELD.
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Barnett, R. E........West Newbury
Barrett, Milo.................Cabot
Beeman, A. B...............Fairfax
Bell, C. J............East Hardwick
Benedict, G. H.............Underhill
Bennett, J. F..............Tunbridge
Bigelow, F. M................Essex
Bridgman, Geo. W ....Hardwick
Bristol, E. S...............Vergennes
Bronson, T. G........East Hardwick

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Chamberlain Bros.........Middlesex
Chamberlain, R. S....Newbury Center
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Chapin, F. D.............Middlesex
Chapin, H. B.............Middlesex
Chapin, J. A..............Middlesex
Chapin, M. E..............Middlesex
Chapin, William..........Middlesex
Chase, Perry.........East Fairfield
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Dow, Ora...................Cabot
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Dutton, Fred.............Woodstock

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Foster, A. M. 2nd.............Cabot
Foster, C. D..................Cabot
Foster, Hon. D. J. Washington, D. C.
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Foster, H. H.................Cabot
Fuller, A. A.................Warren

Gleason, M. E...........Shrewsbury
Gilfillan, W. N. & Son South Ryegate
Grimm, G. H................Rutland

Harrington, F. E........Windham
Harvey, N. C. & C. E......Rochester
Haskins, Hon. Kittedge..Brattleboro
Hayes, J. R..............Stafford
Hewins, H. W........Thetford Center
Hewitt, F. S..............Quechee
Holden, Arthur N....North Clarendon
Holden, John C......North Clarendon
Holden, W. W............Northfield
Hulett, Howard C.........Pawlett

Jackson, H. F.............Westford
Jackson, O. H............Westford
Jenkins, J. D.........East Haven

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Kneeland, D. A..........Waitsfield

Leader Evaporator Co.....Burlington
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Lilley, J. O..............Plainfield
Locke, F. B..........Saxtons River

Martin, C. E.............Rochester
Marsh, Fred..................Cabot

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Morse, Dana H............Randolph
Morse, Ira E..............Cambridge

Northrup, P. B. B...........Sheldon

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Osgood, L. K.............Rutland

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Pierce, B. C..............Waitsfield
Pike, J. Burton
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Rice, A. M............Jeffersonville
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Smith, Richard......West Enosburg
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Wilder, L. O..............Middlesex
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York, W. M..........West Lincoln

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McMahon, C. L...............Stowe
McMahon, M D .... Burlington
Merrill, Olin..........Enosburg Falls
Messer, Alpha, Est.......Rochester
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Steward, J. A.............Rutland
Vail, H. W................Randolph
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